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EVALUATION OF ANTICONVULSANT ACTIVITY OF ETHANOLIC EXTRACT OF LEAVES OF SOLANUM TRILOBATUM LINN IN ALBINO RATS

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ABSTRACT

Solanum Trilobatum Linn, a significant medicinal plant belonging to the Solanaceae family, is more widely accessible insouthern India. Indian traditional medicine makes extensive use of Solanum trilobatum to treat a wide range of human conditions. It was scattered across India's southern regions. S. trilobatum is said to treat a variety of illnesses, including TB, bronchial asthma and respiratory issues. According to reports, S. trilobatum has antimicrobial and hepatoprotective properties activity, immunomodulatory activity, cytotoxic activity, hemolytic activity, antioxidant activity, protective effect, and anti-properties that cause inflammation. The invivo anticonvulsant activity done by electroshock method. The result indicates that the leaf extract of Solanum Trilobatum linn possess anticonvulsant activity.

KEYWORDS: Solanum Trilobatum Linn., Solanaceae, hepatoprotective, immunomodulatory.

INTRODUCTION

Epilepsy is one of the most common neurological diseases and affects people of all ages, races, social classes, and geographical locations. Epilepsy is a disease of the brain characterized by an enduring predisposition to generate seizures and by the neuro biologic, cognitive, psychological, and social consequences of seizure recurrences.

Epilepsy is a chronic non-communicable disorder of the brain that Epilepsy affects people of all age.

It is defined as having two or more unprovoked seizures. It is characterized by recurrent seizures which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized).

Neuro disorder

Epileptic patients suffer from social stigma and discrimination; misconception and negative attitudes of society towards this disorder may prevent epileptic patients from seeking treatment and leading a confident life. This review briefly covers the pathology and classification of epileptic seizures. It also highlights prediction and prevention, diagnosis, differential diagnosis and the various available treatments, including drugs, surgical excision, dietary therapy and gene therapy for epileptic seizures.

Herbal remedies have been recommended in various medicinal treatises for the cure of different diseases. Present anticonvulsant drugs are efficacious in only about 75-80% of cases in general, and they also have their own adverse drug reactions such as gum hypertrophy, hirsutism, osteomalacia, sedation, diplopia, ataxia, and mood changes.

In this regard, herbal based medicines are given much importance as they do not produce adverse effects. Hence, there is a need to conduct research for developing more efficacious and safer antiepileptic drugs**.**

PLANT PROFILE

SOLANUM TRILOBATUM LINN

***Solanum Trilobatum Linn* Leaf**

Botanical name: *Solanum trilobatum L*

Genusname: *Solanum*

Speciesname: *Trilobatum*

Family: Solanaceae

Order: Solanales

Common name: Climbing brinjal, Purple-fruited Pea Eggplant.

Synonyms: Solanum procumbens

Active constituents: Solasodine, Solaine, Tomatidine, Diosgenin, Solbatum.

Vernacular name

Tamil: Thuthuvalai, Nittidam, Sandunayattan, Surai.

English: Climbing brinjal.

Malayalam: Padarchunda, Parachunda, Tootuvalai.

Sanskrit: Alarka, Vallikantakaarika, Kantakaari-lata.

Telugu: Alarkapatramu, Kondavuchinta, Mu llamustil.

Hindi: Kantakaari-lataa.

Botanical description

Solanum trilobatum L. has its place to the family Solanaeace, the nightshade plant originates below the order of Solanales, with 102 genera in addition nearly around 2500 species.

It is a thorny creeper with bluish white flower and grows as climbing under a shrub. It is touchy diffuse, bright green recurrent aromatic plant, wooded at the base, 2-3 m height, found all over Asian continent, mostly in dry places as a wild plant along waysides and harsh environment.

The plant having much branched sharp scandent bushes. The leaves are deltoid, trilateral or wedge-shaped by means of irregularly lobed. Flowers are purplish-blue, in cymes. Berry is globose, pink or crimson. Sahu, J., et al 2013.

Phytochemical studies

Phytochemicals are non-nutritive plant chemicals that partake protective or ailment blocking properties. Phytochemical screening of *Solanum trilobatum* was performed by using water, chloroform, methanol, ethanol and the further variety of organic solvents.

The screened extracts are attempted for Qualitative tests to prove the presence of alkaloids, flavonoids, carbohydrates, glycosides, saponins, tannins, terpenoids, proteins, anthraquinone and are proved by phytochemical analysis. Sahu, J., et al 2023.

All the phytochemicals remained from the *Solanum trilobatum* was used for various activities. The plant also shows the presence of chemical components like sobatum, β solamarine, Desingu. k., et al 2009. Solasodine, Pandurangan, A., et al 2009. Emmanuel, S., et al 2011. solaine, Sahu J., et al 2023. glycol, and disogenin.

Geographical source

The plant is originative in tropical regions of India, Sri lanka, South East Asia.

Medicinal uses

Anti inflammatory

Antioxidant Sini H, et al., 2004.

Antimicrobial and haemolytic activity Kumar SRS, et al., 2011.

Immunomodulatory activity Livingston RNR, et al., 2009.

Anti diabetic activity Anthoni SA, et al., 2011.

Traditional uses

Plants are playing an important role in the health of millions of people's life in many villages of India in their day today life by its traditional usage.

S. trilobatum is reported to cure numerous diseases viz., respiratory problems and bronchial asthma.

S. trilobatum was reported to harbour hepatoprotective activity, antimicrobial activity, larvicidal activity, antidiabetic activity, cytotoxic activity and anticancer activity. The leaves and stem of *S. trilobatum* are reported to possess anti mitotic, anti-inflammatory and anti-ulcerogenic properties.

The leaf extracts are used to increase male fertility and to cure snake poison. It is used with ghee in siddha for treating tuberculosis, as decoction in case of acute and chronic bronchitis, root and berries for treating cough. The major alkaloids identified in the alcoholic extract from leaves and stem part of *S.trilobatum* has been shown to possess antimitotic and antimicrobial activity against bacteria and fungi.

Biological screening of the alkaloid mixture of this plant revealed anticancer activity against certain type of cancer and its effectiveness as an adjuvant in cancer chemotherapy.

Toxicity

Acute Toxicity

Acute oral toxicity of the EEST was carried out as per the guidelines set by the Organization for Economic Co-operation and Development, revised draft guidelines 423.

The principle involved a step-wise procedure with the use of the minimum number of animals per step to obtain sufficient information on the acute toxicity of the test substance. Healthy SD rats (3 animals/dose) of female gender were used for the experiment. Overnight fasted rats were treated with EEST at pre-specified doses of 5, 50, 300, and 2000 mg/kg BW, respectively.

The rats were observed closely for their neurological, behavioral and autonomic profiles continuously for 24 h after dosing.

After a period of 24 h, the animals were observed (at least two times a day) for 14 days to evaluate the changes on behavioral, neurological, autonomic profiles and mortality.

Sub-chronic Toxicity

The adult SD rats of female gender were used for the experiments.

The animals were divided into four different groups as follows: group 1: control; group 2: EEST 100 mg/kg; group 3: EEST 200 mg/kg; group 4: EEST 400 mg/kg. Prior to and at the end of the experiment, the animals' behaviour was monitored.

They were treated with ESST for 30 days through oral gavage. The plant extract was suspended with 0.5% w/v of carboxymethyl cellulose and administered once daily at morning time.

On pre-study day, 15th and 30th day of the experiment, the animals' behaviour such as locomotor action, immobilization time and muscular strength were monitored.

At the end of the study, blood samples were collected form all the experimental animals for biochemical analysis under mild diethyl ether anaesthesia.

Later, they were sacrificed by cervical dislocation and brain, lung, liver and kidney were collected and absolute organ weight were measured. Part of the brain sample was used for the dopamine assay.

Lung, liver, kidney and part of the brain samples were preserved in 10% neutral formalin for histopathological analysis Parasuraman S, et al., 2014.Vogel HG, et al., 2002.

MATERIAL AND METHODS

Material

Ethanol

Solanum trilobactum linn leaf extract

Solvent -Distilled water

Standard food – deprived to about 80% of normal calorie intake.

Experimental animal – Male or Female Albino Rats 150 – 200 gms.

Methods

Maximal Electroshock method

Plant material

Fresh green leaves of *S.trilobatam* popularly known as tuduvalai were obtained in sufficient quantity from suburban places of erode, India. The plant material was authenticated by Dr.P.Radha; Research officer (Botany) Sci II, I/C; Siddha Medicinal Plants Garden/Mettur Dam, Tamilnadu-636401.And a voucher specimen {S120625023T} was submitted at the SSM College of Pharmacy, Erode(638312) Tamilnadu, India.

***Solanum trilobatum* leaves**

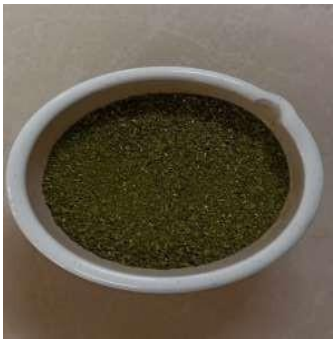
EXTRACT PREPARATION

The Ethanolic extract of *solanum trilobatum* (L) was prepared by maceration. First the aerial part of plant (leaves) was collected, washed and dried at a temperature not exceeding 400^{o}C. After drying, the material was ground into a coarse

powder using a mechanical grinder. A known quantity (100gm) of the powder was placed in a clean glass container, and 500-800ml ethanol was added to the plant material.

The mixture was sealed and left to macerate at room temperature for 72hours, with gentle shaking and stirred it for the every 24 hours to facilitate extraction. After 72 hours, the mixture was filtered by what man filter paperto separate the solid plant material from the liquid extract. The filterate was collected, and the Ethanolic solvent was then evaporated. The final extract was stored in a clean container and in refrigerator below 20^0c.

Dried leaves



Powdered leaves

Maceration process

Filtered product

Drying process

Dried extract

METHODOLOGY

Selection of Animal

OECD GUIDELINE FOR TESTING OF CHEMICALS Acute Oral Toxicity -Acute Toxic Class Method-423.

The preferred rodent species is the rat, although other rodent species may be used. Normally females are used.

This is because literature surveys of conventional [LD50] tests show that, although there is little difference in sensitivity between the sexes, in those casa where difference are observed females are generally slightly more sensitive .However if knowledge of the toxicological or toxicokinetic properties of structurally related chemicals indicates that makes are likely to be more sensitive, then this sex should be used. When the test is conducted in males adequate justification should be provided.

Healthy young adult animals commonly used laboratory strains should be employed. Females should be nulliparous and nonpregnant. Each animal, at the commencement of its dosing, should be between 8 and 12 weeks old and its weight should fall in an interval within +20% of the mean weight of any previously dosed animals.

Preparation of Animal

The animals are randomly selected, marked to permit individual identification, and kept in their cages for at least 5 days prior to dosing to dosing to allow for acclimatization to the laboratory conditions.

Grouping of Animal

Group 1: Control [n=6]

Group 2: Phenytoin sodium 25Mg/Kg (n=6)

Group 3: Ethanolic extract *of Solanum trilobatum* 200Mg/kg (n=6)

Group 2: Ethanol extract of *Solanum trilobatum* 400 Mg/kg (n=6)

Drug administration

Phenytoin standard dose: 25mg/kg/day orally for 14 days.

Ethanolic extract of *solanum trilobatum linn* test dose: 200 and 400mg/kg/day orally for14 days.

Procedure

Albino rats of either sex weighing 150-200gms were selected (n=6) and randomly divided into four equal groups containing four animals in each group.

All the test animals were subjected to further experiment of this study after 24hrs (to avoid any possible “Kindling” effect).

- Group 1 was kept as control.
- Group 2 received phenytoin sodium 25mg/kg intra peritoneally and served as standard after an interval of 30 minutes they were subjected to Maximal electroshock (MES) stimulation of 150mA for 0.2 seconds through trans-auricular electrodes by using techno-electro- convulsometer.
- Group 3 received ethanolic extract of solanum trilobatum linn 200mg/kg orally.
- Group 4 received ethanolic extract of Solanum Trilobatum L 400mg/kg orally respectively.

After an interval of 60minutes they were subjected to Maximal electroshock (MES) stimulation of 150MA for 0.2 seconds through trans-auricular electrodes by using techno- electro convulsemeter. The duration of different parameters like Seizure Latency (Time taken for onset of seizure), Tonic flexion of fore limb, tonic extension of hind limb, Clonus and Stupor were observed.(Sharath Kumar K, *et al*., 2015.)

Dose in syringe

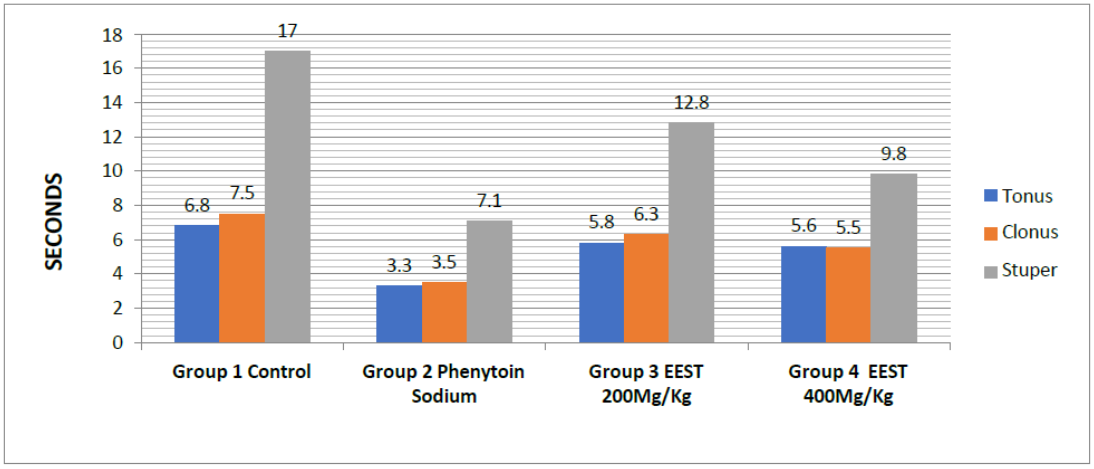
Drug administration

RESULT

GROUPS	TONUS	CLONUS	STUPOR	RECOVERY
Group 1 Control	6.8±0.75	7.5±0.54	17±0.89	Recovered
Group 2 phenytoin sodium 25mg/kg	3.3 ± 0.47	3.5 ± 0.50	7.1 ± 0.89	Recovered
Group 3 EEST 200mg/kg	5.8 ± 1.06	6.3 ± 0.74	12.8 ± 0.68	Recovered
Group 4 EEST400mg/kg	5.6 ± 0.47	5.5 ± 0.5	9.8 ± 0.68	Recovered

P<O.O5 is significant as compared to standard, P<0.0001,EEST :Ethanolic extract of *solanum trilobactum L* leaves, SD: Standard deviation.

Graphical representation



Result

No adverse effect or mortality was detected in swiss albino rat at to g/kg of EEST. All the animals were alive, healthy and active during the observational period of 14-days. Hence, LD 50 was considered as >1000 mg/kg.

DISCUSSION

The recent trend in human health care is to use more of plant derived products for prevention and therapy of various disease. Indian herbs have the potential to become the first-line therapies for disease with unmet medical needs. However, most of the anti epileptic drugs are inaccessible, more costly and possess many toxic adverse effect.In this regard, there is a need for development of safer, efficious and more economical anticonvulsant agent from plant and

other source.

In the present study the anticonvulsant action of solanum trilobatum L leaf extract was evaluated in albino rats. According to literature, *solanum trilobatum L* having a number of medicinal properties like antiepileptic, respiratory issues, antioxidant property, Anti inflammatory effect. The previous studies have shown that EEST leaves exhibit significant antiepileptic activity.

In this study, EEST at high dose (400mg/kg) (5.6 ±d0.47, P<0.0001) imhibits the type of seizures and shortens the duration hindlimb extension effectively then compared with standard groups (Phenytoin sodium) based on present study results we conclude that the EEST possess potent anticonvulsant activity. However, further studies are recommended to know the underlining mechanism of anticonvulsant activity and for isolation of active ingredients of the plants

CONCLUSION

The Ethanolic ectract of *Solanum trilobatum* (tuduvalai) has shown Anticonvulsant properties.

This study indicates that the extract may help protect against seizures induced by maximal electroshock method.

Further research is needed to fully understand the mechanism of action and to determine the extract efficacy and safety for human use.

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