ANAYURVEDIC INSIGHT TOWARDS EPILEPSY

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ABSTRACT
In Ayurveda, Mental disorders and psychological temperaments have been broadly described [e.g. vata vyadhi (nervous disorders), unmada (insanity), mura, maha (loss of consciousness), vismriti (amnesia), apasmar (epilepsy) etc.]. In Ayurveda, Apasmar (or epilepsy) has been described among the maharoga (a group of eight diseases well-known for causing serious morbidity). In the Ayurvedic texts, Apasmaara (Epilepsy) is defined as sudden abhorrent bodily activities (vibhatsa-cheshta) accompanied by momentary blackouts or loss of consciousness (tama-praveshha) owing to disturbance in mental faculties of dhi (intelligence), dhriti (retention) and smriti (memory). Epilepsy is a major public health problem all over world. The estimated proportion of the general population with active epilepsy (i.e. continuing seizures or the need for treatment) at a given time ranges from 4-10 per 1,000 people. Herbal remedies have been recommended in various medical treatises for the cure of different diseases. In this regard, there is great prospective for identifying excellent Ayurvedic components or its active principles, particularly in consideration of the fact that such substances may provide maximum advantage with cost effectiveness, least side effects, and improvement of patient compliance.

Keywords: Apasmaara, Epilepsy, Maharoga, Herbal remedies.

INTRODUCTION
In Ayurveda, Mental disorders and psychological temperaments have been broadly described [e.g. vata vyadhi (nervous disorders), unmada (insanity), mura, maha (loss of consciousness), vismriti (amnesia), apasmar (epilepsy) etc.]. In Ayurveda, Apasmaaara (or epilepsy) has been described among the maharoga (a group of eight diseases well-known for causing serious morbidity) which can only be controlled to some extent with medical therapies and yet still sometimes remain uncured and even uninhibited. In the Ayurvedic texts, Apasmaara (Epilepsy) is defined as sudden abhorrent bodily activities (vibhatsa-cheshta) accompanied by momentary blackouts or loss of consciousness (tama-praveshha) owing to disturbance in mental faculties of dhi (intelligence), dhriti (retention) and smriti (memory). Vagbhata defines it as loss (apaaaya) of memory (smriti). There are plentiful references to all aspects of epilepsy accompanied by prodromal symptoms (poorvaroop), clinical features (rupa), pathogenesis (samprapti), diagnosis, and treatment (chikitsa) in the Ayurvedic literature.

Epilepsy is a major public health problem all over world. The estimated proportion of the general population with active epilepsy (i.e. continuing seizures or the need for treatment) at a given time ranges from 4-10 per 1,000 people. Epilepsy has significant economic implications in terms of premature death, health care-needs, and lost work productivity. WHO has recognized epilepsy to be a major public health problem. WHO, the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE) are carrying out a global campaign to provide better information and raise awareness about epilepsy, and strengthen public and private efforts to improve care and reduce the disorder's impact.

Definition
The word “epilepsy” comes from the Greek and means to be taken, seized or attacked. Epilepsy is a common and diverse set of chronic neurological disorders characterized by seizures. Seizures are episodes of disturbed brain activity that cause changes in attention or behaviour. Epilepsy is a chronic neurological disorder that affects people of all ages. Epilepsy is characterized by “recurrent, episodic, paroxysmal, involuntary clinical events associated with abnormal electrical activity from the neurons”. It is a life-long tendency, though the seizures may start at any time during life and occur at irregular intervals or frequently.

Prodromal symptoms, Classification and Etiology
Acharya Sushruta describes various causes of Apasmara e.g. excessive, inadequate and improper consideration to the objects of the sense as well as to their actions, part taking of filthy, contaminated, unwholesome and unhygienic uncongenial foods and regimen of conduct, repression of any natural urging of the body or aggravation of the rajas and tamas (manas guna), or psychological factors (likewise indulgence in amorous fancies, fright, anxiety, anger, or grief, etc.), leads to an aggravation of the bodily doshas (harmors) which in their turn affect the mind (chetas) ultimately and leading to the manifestation of the epileptic fit in the form of shaking body movements, jerks or convulsions (akshepaka) or episodes of brief unconsciousness and at last give rise to Apasmara.

There are different causes of epilepsy that are common in certain age groups. These are: 1) During neonatal period and early infancy causes include hypoxic ischemic...
encephalopathy, CNS infections, trauma, congenital CNS abnormalities, and metabolic disorders. 2) During late infancy and early childhood: febrile seizures, CNS infection and trauma etc. 3) During childhood, well-defined epilepsy syndromes. 4) During adolescence and adulthood, idiopathic epilepsy, trauma, CNS infections, brain tumors, illegitimate drug use and alcohol withdrawal. 5) In older adults, cerebrovascular diseases is a very common cause and other causes are CNS tumors, head trauma, and other degenerative diseases that are common in the older age group, such as dementia. Premonitory symptoms of Apasmara as in Ayurveda are sensations of pounding of the heart, emptiness or lightness in the head, perspiration, pensiveness, fainting, stupified appearance and sleeplessness, which are usually found to usher in an attack. Symptoms of apasmara in Ayurveda are described in the respective doshaj type as Vataj, Pittaja, Kaphaja and Sannipataja types. In vataj apasmara: shivering, clenching of the teeth, laboured breathing and foaming at the mouth present. Similarly thirst, increased heat of the body, perspiration, fainting, mild tremor of the limbs and restlessness in pitaj and shivering, nausea, sleepiness, falling on the ground and vomiting of mucus in kaphaj, and mixed features in sannipataj apasmara. Clinical features include seizures, loss of awareness or consciousness, disturbances of movement, hallucinations (including vision, hearing and taste), mood or mental function. People with seizures tend to have more physical problems (such as fractures and bruising), higher rates of other diseases or psychosocial issues. Acharya Charaka also mentioned that aggravated vatadi dosha produces apasmara episodes in the interval of every fifteen days or in monthly time period. For clinical description, epilepsy broadly described as generalized or partial (focal). ILAE classified epilepsy as generalized, localized and undetermined syndromes which have their sub types and characteristics clinical features.

**Clinical examination, Diagnosis and Treatment**

In Ayurveda, Rogi-pariksha (an inclusive evaluation of the patient) and roga-pariksha (Poorvarupa, Rupa, and Samprapti) are to precede the disease diagnosis. In other words, a detailed history of the patient for a correct diagnosis is emphasized in Ayurveda. For the management of apasmara, the Panchkarma therapy, (i.e. Vaman, Virechan, Vasti and Nasyadi), has been advised which utilises a number of formulations as : 1) Ghritas (clarified butters) - Panchgavya ghrita, Brahmi ghrita, Vachadi ghrita, Goghrita etc. 2) Medicated oil-Kathviadi oil, Palankshadi oil, Trilaphadi oil etc. 3) Dhumara drayvas and nasya yoga 4) Rasaushadhi-Bhutbhairava rasa, Vatakulantaka rasa, Subthasama etc. Acharya Sushruta also recommended Siravedha (blood-letting) from the veins of the temples in epilepsy. Epilepsy requires management under supervision of a physician for prolonged period which may extends from one to four decades. Age, sex, economic factors and seizure type determine choice of anti epileptic drugs. Commonly used anti epileptic drugs are Phenobarbitone, Phenytoin, Sodium Valporate, Carbamazepine, Cloazepam, Diazepam, and ACTH etc.

The ideal anti-seizure drug is supposed to suppress all seizures without causing any untoward effect. Unfortunately these drugs also frequently cause side effects. In addition to adverse effects, other important parameter like safety, tolerability, efficiency, expenses especially in long term therapy, serum drug monitoring etc. are other limitations with synthetic antiepileptic drugs. For example, Phenobarbitone has adverse effects like behavioural abnormalities, diminution of intelligence, impairment of learning and memory, rashes, megaloblastic anemia and osteomalacia etc. occur in some patients on prolonged use. Similarly other anti epileptic drugs also has adverse effects in prolonged use.

Herbal remedies have been recommended in various medical treatises for the cure of different diseases. Phytomedicine consists of many organic chemical constituents with complex pharmacological effects on the body. Considering the burden of epilepsy management, there has been a continuous effort to develop drugs that will postponement the development and arrest the progress of the disease. In this regard, there is great prospective for identifying excellent Ayurvedic components or its active principles, particularly in consideration of the fact that such substances may provide maximum advantage with cost effectiveness, least side effects, and improvement of patient compliance. So, Ancient medicine systems should be combined to plan effective health-care delivery systems for better epilepsy care. There is following ayurvedic formulation which showed the antiepileptic effects as: 

**Acorus calamus:** The roots and rhizomes of *Acorus calamus* have been used in the ancient systems of medicine for the treatment of various neurological disorders. The effects of aqueous extract of *Acorus calamus* was evaluated on electrical and chemical induced seizures in albino mice and results indicates that aqueous extract has protective effect against maximal electrical shock (MES), but not against pentylenetetrazole (PTZ) induced seizures. V. Pandy et al. research provided evidences that methanol and acetone extracts of *Acorus calamus* may contain psychoactive substances that are CNS depressant in nature while used in mice. R hazara et al. study also showed that *Acorus calamus* possesses the ability for preventing the development of FeCl3-induced rat epileptogenesis by modulating antioxidant enzymes.

**Albizia lebbeck:** The ethanolic extracts of leaves of *A. lebbeck* and flowers of *Hibiscus rosa sinensis* and the petroleum ether extract of flowers of *Butea monosperma* was evaluated for anticonvulsant activity in mice and findings showed that these fractions protected the animals from maximum electro shock, electrical kindling and pentylenetetrazole-induced convulsions. In other study, saponins of *A. lebbeck* leaves showed nootropic and anxiolytic activity.

**Anacyclus pyrethrum:** Hydroalcoholic extract of *A. pyrethrum* administration significantly prevented seizure induced oxidative stress and cognitive impairment in a dose-dependent manner as well as normalized the decrease in cholinesterase activity caused by seizures when evaluated in male wistar rats.

**Anisomeles malabarica:** The ethyl acetate extract of *A. malabarica* leaves evaluated for the anti-epileptic...
potential against PTZ- and MES model in wistar rats and study concluded that the flavonoids fraction of the extract of Anisomeles malabarica leaves has antiepileptic potential.

**Antchocephalus cadamba:** The ethanolic extract of *A. cadamba* bark was used in various experimental animal models for sedative and antiepileptic activities and investigatory results proved sedative and antiepileptic activities.

**Argyreia speciosa:** Different doses of *A. speciosa* extract were used in the mice for 10 days and then, mice were subjected to either pentylentetrazole (80 mg/kg) or maximal electroshock seizures treatment and study revealed anticonvulsant effect of *Argyreia speciosa* against pentylentetrazole - and maximal electroshock-induced convulsions in mice. In other study, the hydroalcoholic extract of *Argyreia speciosa* root showed significant antistress activity in the trail animals.

**Asparagus racemosus:** The extracts of *A. racemosus* was investigated by studying the effects on seizures induced by maximal electroshock (MES) and pentylentetrazole in rats for the anticonvulsant activity and results showed significant anticonvulsant effect by decreasing the duration of hind limb extension (extensor phase), clonus and also the duration of stupor phase as compared to control in MES test. Methanol extract and aqueous extract of *A. racemosus* significantly prolonged the onset of tonic seizures which was induced by pentylentetrazole.

**Bacopa monnieri:** *Bacopa monnieri* is a nerve tonic used for raising the mental performance in Ayurveda therapy. It helps in concentration, comprehension, recall and alertness. Reas Khan et al indicates the neuroprotective role of *B. monnieri* extract in glutamate-mediated excitotoxicity during seizures and cognitive damage occurring in association with pilocarpine-induced epilepsy. Jobin Mathew et al studied the effects of *Bacopa monnieri* and its active component, bacoside A, on motor deficit and alterations of GABA receptor functional regulation in the cerebellum of epileptic rats were investigated and results showed prevention of the occurrence of seizures thereby reducing the impairment of GABAergic activity, motor learning, and memory deficit.

**Benincasa hispida:** *Benincasa hispida* ethanol extract at the dose levels of 250 and 500 mg/kg p.o. produced significant (P<0.01) anticonvulsant effect when used in swiss albino mice.

**Berberis vulgaris:** Berberine (an isoquinoline alkaloid from *Berberis vulgaris*) exhibits anticonvulsant activity by modulating neurotransmitter systems during trial in pentylentetrazole, maximal electroshock (MES) and kainic acid (KA)-induced convulsions in mice. The another study concluded that berberine at high doses could be a useful protective agent in PTZ induced epileptic seizures in rats.

**Boerhaavia diffusa:** Anticonvulsant activity of methanolic extract, liriodendrin-rich fraction, chloroform fraction and phenolic compound fraction were studied in pentylentetrazol (PTZ)-induced seizures. The crude methanolic extract and liriodendrin-rich fraction showed a dose-dependent protection against PTZ-induced convulsions.

**Bramhi formulations:** The effect of Bramhi Ghrita (a polyherbal formulation containing *Bacopa monnieri*, *Evolvulus alsinoides*, *Acorus calamus*, *Saussurea lappa* and cow's ghee) on motor coordination, behavior, sleep, convulsions, locomotion and analgesia was evaluated in mice using standard procedures and results showed that Bramhi Ghrita protected mice from maximum electroshock and pentylentetrazole-induced convulsions. Brahmi Rasayan (an Ayurvedic preparation) was studied in mice and rats for its effects on the central nervous system at oral doses and trail suggests an involvement of the GABAergic system in the mediation of the central nervous system effects of Brahmi Rasayan.

**Butea monosperma:** During trial, the anticonvulsive principle of *B. monosperma* was found to be a triterpene (TBM) present in the n-hexane: ethyl acetate fraction of the petroleum ether extract. TBM exhibited anticonvulsant activity against seizures induced by maximum electroshock (MES). TBM also inhibited seizures induced by pentylentetrazol (PTZ), electrical kindling, and the combination of lithium sulfate and pilocarpine nitrate.

**Caesalpinia sp.:** NI Baek et al showed that the extracts from the wood of *Caesalpinia sappan* were fractionated using various steps and got compounds which showed remarkable anticonvulsant activity. Similarly in study done by Dinesh Kumar et al ethanol extract of *Caesalpinia pulcherrima* leaves was investigated for anticonvulsant effect against maximal electroshock (MES) and pentylentetrazole (PTZ) induced seizures in rats and mice at dose levels 200 and 400 mg/kg, i.p. respectively. The results of the study suggest that ethanol extract of *Caesalpinia pulcherrima* leaves possess anticonvulsant effect.

**Calotropis gigantea:** Alcoholic extract of peeled roots of *Calotropis gigantea* was tested in albino rats for CNS activity. These results show the analgesic, anticonvulsant, anxiolytic and sedative effect of the extract. In second study, evaluation of different extracts of stem barks of *Calotropis gigantean* for the anti-convulsant effect done by using MES and PTZ induced seizure models and findings concluded the potential anticonvulsant activity.

**Cannabis sativa:** The natural *Cannabis sativa* compounds decreased the susceptibility of rat dorsal hippocampus to seizure discharges caused by afferent stimulation (cannabidiol supposed through effectively block the release of K from the hippocampus caused by afferent stimulation) which showed its anticonvulsant activity. Another work suggests that the anticonvulsant action of *Cannabis indica* resin in the rat is serotonin- and not catecholamine-mediated. Similarly other studies showed anticonvulsant activity of *Cannabis sativa* compounds.

**Capparis sp.:** An alcoholic extract of aerial parts of *C. Deciduas* (including flowers and fruits) was screened for central nervous system activity using conventional behavioral animal models. In the pentylentetrazole-induced seizures test, the *C. decidua* extract dose-dependently decreased (P < 0.05) the number of animals with convulsions and increased convolution latency (P < 0.001) and the extract also decreased the duration of...
Cedarwood: Alcohol extract of heartwood of *Cedrus deodara* was tested for its anxiolytic and anticonvulsant activity. Pentylenetetrazole (PTZ) and Maximal electro shock (MES) induced convulsions models in mice were used for the assessment of its anticonvulsant activity and findings showed the anxiolytic and anticonvulsant activity.

Celastrus paniculatus: The effect of *Celastrus paniculatus* seed aqueous extract on learning and memory was studied in rats and mice and the study reveals that the aqueous extract of *Celastrus paniculatus* seed has dose-dependent cholinergic activity, thereby improving memory performance.

Centella asiatica: G. Visweswari *et al* suggested the anticonvulsant activity of different extracts of *C. asiatica* was due to its perceptible changes in the cholinergic system. Visweswari G. *et al* similarly showed the anticonvulsant and neuroprotective activity of *Centella asiatica*. Y.K. Gupta *et al* evaluated the effect of aqueous extract of *Centella asiatica* on the course of kindling development, kindling-induced learning deficit and oxidative stress markers in pentylenetetrazole (PTZ) kindled rats and showed potential as adjuvant to antiepileptic drugs as well as preventing the cognitive impairment.

Cissus quadrangularis: The aqueous extract of the stem of *C. quadrangularis* when used in trailed mice results in protection of mice against maximal electroshock, pentylenetetrazol, strychnine and n-methyl-d-aspartate-induced seizures or turning behavior and delayed the onset time of seizures induced by isonicotinic hydrazid acid. The results concluded that the extract of *C. quadrangularis* possesses anticonvulsant and sedative properties in mice.

Clerodendrum infortunatum: Saponin (SN1) isolated from *C. infortunatum* leaves showed the anticonvulsant activity when tested in leaptazol-induced seizures. Similarly anticonvulsant activity of methanolic extract of *Clerodendron infortunatum* was noticed in albino mice and extract significantly delayed (p < 0.01) the onset and antagonized PTZ-and STR-induced seizures.

Convolvulus pluricaulis: The methanolic extract of whole plant of *C. pluricaulis* was evaluated for antioxidant activity (by using DPPH free radical scavenging model) and anticonvulsant activity (by using maximal electroshock seizure model). Experimental results have shown that the extract reduced the mean recovery time from convulsion. During other trail, *C. pluricaulis* (aqueous extract) possesses neuroprotective potential used in aluminium chloride induced neurotoxicity in rat cerebral cortex.

Curcuma longa: The anticonvulsant activity of bisabolene sesquerpenoids of *C. longa* in zebrafish and mouse seizure models were noticed during this study. In another trail, Jithendra Chimakurthy *et al* showed the significant effect of curcumin on the maximal electro shock induced Generalized tonic clonic seizures when studied against sub therapeutic doses of phenytoin and sodium valporate as well as has effect on memory retention in seizure induced rats.

Cyperus rotundus: Porwal Mayur *et al* suggested that *Cyperus rotundus* roots and rhizomes showed anticonvulsant effect against PTZ and PTX induced convulsions which may be mediated, at least partly, through GABA A-benzodiazepine receptor complex. Shivkumar SI *et al* found the flavonoids present in ethanol extract could be attributed for anticonvulsant activity. Mohsen Khalili *et al* also concluded that *C. rotundus* rhizome extract, probably via its antioxidant properties could have exerted a potent antiepileptic effect.

Delphinium denudatum: The ethanolic extract and aqueous fraction of this plant screened for anticonvulsant utilising the maximal electroshock and subcutaneous pentylenetetrazole, biccuculline, picrotoxin and strychnine tests for anticonvulsant activity. The results suggest the presence of potent anticonvulsant compounds in AF of *D. denudatum*.

Desmodium triflorum: Girish Gowda *et al* revealed that *D. triflorum* possesses a significant dose dependent anticonvulsant activity when used in animal models of epilepsy.

Emblica officinalis: Hydroalcoholic extract of *E. officinalis* administered to rats was evaluated on pentylenetetrazol (PTZ) induced seizures, cognitive deficit and oxidative stress markers and results in completely abolished the generalized tonic seizures and improved the retention latency in passive avoidance task as well as ameliorated the oxidative stress induced by PTZ.

Erythrina variegata: Aqueous extract of *Erythrina variegata* showed significant anxiolytic and anticonvulsant activity, also showed significant modulation of GABA levels in cerebellum and also in whole brain other than cerebellum.

Ficus sp.: Dhanasekaran Sivaraman and Palayan Muralidaran *et al* suggested that potencially antiepileptic compounds are present in the methanol leaf extract of *Ficus hisipda*. Damanpreet Singh *et al* concluded that the hydroethanolic extract of adventitious roots of *Ficus religiosa* has anticonvulsant activity. Retention of anticonvulsant effect in the saponins-rich fraction-treated animals indicated the role of saponins for the activity. Minal S. Patil *et al* suggested that an orally administered aqueous root extract of *Ficus religiosa* has anticonvulsant activities against strychnine- and pentylenetetrazole-induced seizures. The appreciable content of zinc and magnesium in the extract may be ascribed to the observed activities. Damanpreet Singh and Rajesh Kumar Goel *et al* suggested that the methanolic extract of figs of *Ficus religiosa* had anticonvulsant activity against MES and picrotoxin induced convulsions, with no neurotoxic effect.
**Glycyrrhiza glabra:** The ethanolic extract of *G. glabra* inhibits PTZ and lithium-pilocarpine-induced convulsions in albino rats and mice. Other study showed that glycyrrhizic acid has anticonvulsant action when used in Pentyleneetetrazole and Isoniazid induced convulsions. The extract and the fractions of *G. glabra* var. glandulifera showed anticonvulsant effect in PTZ test.

**Hemidesmus indicus:** The ethanolic extract of *H. indicus* had reduced the duration of tonic extensor phase and postictal depression in maximal electro shock method and the duration of clonus in pentylentetrazol method and showed antiepileptic activity.

**Hypericum perforatum:** The extracts of *H. perforatum* aerial parts were evaluated and showed anticonvulsant effect and this effect may be partially mediated by nitric oxide pathway.

**Hyoscyamus niger:** Methanolic extract of *H. niger* possesses the anticonvulsant activity against picrotoxin-induced seizures in mice.

**Indigofera tinctoria:** The methanolic (90%) extract of *Indigofera tinctoria* was screened for antiepileptic activity on maximal electroshock (MES) and pentylentetrazole (PTZ) induced seizures models in albino wistar rats and showed significant antiseizure activity. In another study, the ethanol extract of *Indigofera tinctoria* was found to be useful in controlling lithium/pilocarpine-induced status epilepticus in albino rats.

**Mimosa pudica:** The decoction of *Mimosa pudica* leaves given intraperitoneally at dose of 1000-4000 mg/kg protected mice against pentylentetrazol and strychnine-induced seizures which showed anticonvulsant activity.

**Moringa oleifera:** Amritula Jay N et al indicates that methanolic extract of *M. oleifera* leaves showed anticonvulsant activity during study and hence may help to control grand mal and petit mal epilepsy.

**Mucuna pruriens:** *M. pruriens* (100 mg/kg) has significant antiepileptic and antiepileptoid activity in haloperidol-induced catalepsy, maximum electro-shock method, pilocarpine-induced status epilepticus.

**Myristica fragrans:** The extract of *M. fragrans* exhibited anticonvulsant activity against maximum electroshock, pentylentetrazol, picrotoxin, and lithium sulphate-pilocarpine nitrate during trial. Second trial results indicate that nutmeg oil may be effective against grand mal and partial seizures.

**Nardostachys jatamansi:** Ethanol extract of the roots of *N. jatamansi* showed significant anticonvulsant activity against maximum electroshock seizure in rats. The herbal extract of *N. jatamansi* also has sedative and anxiolytic effect when trailered in rats. Ethanolic extract of *N. jatamansi* noticed memory restorative when administered young and aged mice.

**Nerium oleander:** Different extracts of *N. Oleander* showed significant anticonvulsant activity in maximal electro shock and pentylene tetrazole induced convulsions in a dose dependent manner.

**Nigella sativa:** The constituents of *N. sativa* seed were evaluated for anticonvulsant activity using pentylentetrazol (PTZ) and maximal electroshock (MES)-induced convulsions and showed varying degree of anticonvulsant activity.

**Nilumbus nucifera:** *N. nucifera* have mild to moderate anticonvulsant property when evaluated in mice and may be due to involvement of GABA.

**Octocin sp.:** Different extracts of stem, leaf and stem callus of *O. sanctum* were tested and showed anticonvulsant activity using maximal electroshock (MES) model. C. O. Okoli et al findings suggest that extracts of *Ocimum gratissimum* plant possess anticonvulsant and anxiolytic-like properties during evaluation in mice.

**Pongamia pinnata:** The anticonvulsant efficacy of the leaf extract of *P. pinnata* was investigated by using maximal electroshock-induced seizure (MES) in mice and findings indicate the anticonvulsant action of *P. pinnata*, probably due to the presence of flavonoids. In another study, by Petroleum ether extract of *P. pinnata* stem bark (800 mg/kg) and its fractions possesses anticonvulsant activity against PTZ and MES induced convulsions.

**Pueraria tuberosa:** The alcoholic extract of tubers of *P. tuberosa* anticonvulsant activity was tested by using maximal electroshock (MES), pentylene tetrozole (PTZ), strychnine induced convulsions and findings suggested anticonvulsant property.

**Ricinus communis:** The anticonvulsant activity of the isolated compound of *R. communis* was evaluated in mice using the maximal electroshock (MES) model which noticed significantly (*p < 0.05*) reduction of convulsion by MES-induced seizures in albino mice when compared with the standard drug diazepam.

**Rubia cordifolia:** Triterpene (isolated from the acetone soluble part of petroleum ether extract of *R. cordifolia*) inhibited seizures induced by maximum electro shock, electrical kindling, pentylentetrazol, and lithium-pilocarpine in rats and mice.

**Saussurea lappa:** *S. lappa* root’s petroleum ether extract possesses anticonvulsant activity against pentylentetrazol and picrotoxin-induced convulsions in mice, by elevating the seizure threshold through GABAergic mechanism during study. The ethanolic extract of the root of *S. lappa* exhibited significant anticonvulsant activity in maximal electroshock induced convulsions and pentylentetrazol-induced clonic convulsions in Swiss albino mice.

**Sesbania grandiflora:** The triterpene containing fraction of *S. grandiflora* exhibits anticonvulsant profile and anxiolytic activity when used seizures in mice.

**Smilax sp.:** Ethanolic extract and ethyl acetate fraction of the rhizome of *Smilax china* reduced maximal electroshock (MES) and pentylentetrazole (PTZ)-induced seizures in mice. Similar antiepileptic activity of alcohol and aqueous extracts of roots and rhizomes of *Smilax zeylanica* noticed in trail of *Smilax zeylanica* when in Swiss albino mice.

**Solanum nigrum:** The aqueous extract of the leaves of *S. nigrum* in chicks, mice and rats possessed anticonvulsant property.

**Solanum surattense:** Methanolic and aqueous extracts of whole plant of *S. surattense* possess the anticonvulsant activity when used against MES and PTZ induced seizures in rats.

**Sphaeranthus indicus:** The hydroalcoholic extract of the *S. indicus* demonstrated anticonvulsant as well as...
An epileptic seizure or fit is caused by a transient, excessive and abnormal discharge of nerve cells. It is clearly a major public health problem. Ayurveda is a traditional Indian medicinal system being practiced for thousands of years. So, the alternative drug therapy for the management of this disease can be by the use of medicinal plants and their active principles. Thus it may be concluded that herbal drugs make anticonvulsant treatment more rational and patient friendly. Modern and ancient medicine systems should be combined to plan treatment more rational and patient friendly. In the present review article, selected plants reported in Ayurveda’s Hindi Commentary, Chaukhamba Sanskrit Edition, New Delhi, CBS Publishers & Distributors Pvt. Ltd, 2009;4: 79-86, http://dx.doi.org/10.3923/jpt.2009.79.86


CONCLUSION

An epileptic seizure or fit is caused by a transient, excessive and abnormal discharge of nerve cells. It is clearly a major public health problem. Ayurveda is a traditional Indian medicinal system being practiced for thousands of years. So, the alternative drug therapy for the management of this disease can be by the use of medicinal plants and their active principles. Thus it may be concluded that herbal drugs make anticonvulsant treatment more rational and patient friendly. Modern and ancient medicine systems should be combined to plan effective health-care delivery systems for better epilepsy care. In the present review article, selected plants reported to possess anticonvulsant activity. These were tried in experimental animals, so these herbal plants should be used in appropriate formulations to verify their anticonvulsant activities.

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