Review Article

Traditional Herbs Used In Treatment of Epileptic Seizures

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ABSTRACT

India is one of the nations blessed with rich heritage of traditional medicinal system and rich biodiversity to complement the herbal needs of the treatment administered by these traditional medicinal systems.Generally herbal formulations are considered moderate in efficiency and less toxic than most pharmaceutical agents. In the western world, the developing concept that 'Nature' is better than 'Chemical' or 'Synthetic' has lead to the evolution of Neo – Western Herbalism. A current estimates that, in many developing countries of the world, 80% population still they relay heavily on traditional healers and medicinal plants, for their primary health- care needs. In India several plants that were reputed to posses' antiepileptic properties have been found to contain active ingredients when tested with modern bioassay for detecting anti-conticonvulsant activities. The present review article focus on traditional herbs used in treatment of epileptic seizures almost 70 herbs mentioned in this article along with its pharmacological action to prevent seizures.

INTRODUCTION

The term seizure refers to a transient alteration of behavior due to the disordered, synchronous, and rhythmic firing of populations of brain neurons. The term epilepsy refers to a disorder of brain function characterized by the periodic and unpredictable occurrence of seizures. Seizures can be "Nonepileptic" when evoked in a normal brain by treatments such as electroshock or chemical consultants or "Epileptic" when occurring without evident provocation.Seizures are thought to arise from the cerebral cortex, and not from other central nervous system (CNS) structures such as the thalamus, brainstem, or cerebellum[1]. Epilepsy is a neuropsychiatric disorder characterized by paroxysmal cerebral dysrhythmia, manifesting as brief episodes (seizures) of loss or disturbance of consciousness, with or without characteristics body movements (convulsions), sensory or psychiatric phenomena. It is a common brain disorder characterized by two or more unprovoked seizures. Seizures are discrete events caused by transient, hypersynchronous and abnormal neuronal activity. Recognized from the down of history of "disease of lightening" it was correctly described by J.H. J. Littre over a century ago[2].

Classification

Classification of seizure types and epilepsy syndrome should always be attempted, as both may have implication for management and prognosis.

1. Partial seizures

a) Simple partial (no alteration of consciousness) :

Results from focal epileptic discharge in a localized part of the brain. Partial seizures arise from localized regions of the cerebral cortex. A simple partial motor seizure begins in the motor cortex. When it spreads sequentially through the motor strip, it is called a Jacksonian march.

b) Complex partial (with alteration of consciousness):

A prodrome is common and automatisms are seen in 90% of patients, with post ictal drowsiness in 75% of patients.

c) Partial becoming secondarily generalized (secondary generalized tonic-clonic seizures):

A partial seizure which spreads to the entire brain to produce a convulsion is a secondary generalized seizure.

2. Generalized seizures

Generalized-onset seizures arise from the reciprocal firing of the thalamus and cerebral cortex.

a) Absence seizures:

A brief episode of unconsciousness with little or no motor accompaniment. (Petit mal). Absence seizures occur in children; they are much less dramatic but may occur more frequently (many seizures each day), than

tonic-clonic seizures. The patient abruptly ceases whatever he or she was doing, sometimes stopping speaking in mid-sentence, and stares vacantly for a few seconds

b) Myoclonic seizure:

Usually single, sudden, uncontrollable jerks.

c) Clonic seizure

d) Tonic seizure

e) Tonic-clonic seizure

An epileptic attack in which there is loss of consciousness and generalized tonic then clonic muscle contractions. A tonic-clonic seizure consists of an initial strong contraction of the whole musculature, causing a rigid extensor spasm. Respiration stops and defecation, micturition and salivation often occur. This tonic phase lasts for about 1 minute and is followed by a series of violent, synchronous jerks, which gradually dies out in 2-4 minutes. s tonic phase lasts for about 1 minute and is followed by a series of violent, synchronous jerks, which gradually dies out in 2-4 minutes.

f) Atonic seizure:

An attack in which there is generalized loss of muscle tone, and the patient falls down. Consciousness is not lost.

Causes and risk factor

There may be a clear precipitating cause, e.g. inadequate sleep, alcohol abuse or medications such as tricyclic antidepressants, which lower the seizure threshold.

Possible seizure related symptoms include

- Sudden falls
- Involuntary jerky movements of limbs whilst awake
- Blank spells
- Unexplained incontinence of urine with loss of awareness, or in sleep
- Odd events occurring in sleep, e.g. fall from bed, jerky movements, automatisms
- Episodes of confused behavior with impaired awareness
- Possible simple partial seizures
- Epigastric fullness sensation
- Deja vu
- Premonition
- Elation, depression
- De-personalisation, derealisation
- Inability to understand or express language (written or spoken)
- Loss of memory, disorientation
- Olfactory, gustatory, visual, auditory hallucinations
- Focal motor or somatosensory deficit, or positive symptoms (jerking, tingling).

Mechanism of action of antiepileptic drugs

Three main mechanisms appear to be important in the action of antiepileptic drugs

- Enhancement of GABA action
- Inhibition of sodium channel function
- Inhibition of calcium channel blocker

Table 1:

S.No.	Category	Drugs	Mechanism of Action	Side effects
1	Barbiturates	Phenobarbitone	Prolongation of inhibitory action of GABA - A	Tolerance, dependence
2	Deoxybarbiturates	Primidone	Prolongation of inhibitory action of GABA - A	Anemia, Psychotic reactions
3	Hydantoins	Phenytoin	Inactivation of voltage activated Na^+ channels	Osteoporosis, gumhypertrophy, hirsutism, foetal hydantoin syndrome
4	Iminostilbene	Carbamazepine, Oxycarbazepine	Prolongation of sodium channel inactivation	Agranulocytosis, lupus syndrome, hepatotoxicity
5	Succinimides	Ethosuximide	Inhibition of T – type of Ca^{++} current	Agitation, blood dyscrasias
6	Aliphatic carboxylic acid	Valproic acid	Prolongation of inhibitory action of GABA – A.	Alopecia, polycystic ovarian disease in young girls
7	Benzodiazepine	Diazepam, Clonazepam, Clobazam	Fascilitate the Cl^- channel opening	Insomnia, Psychomotor retardation
8	Phenyltriazine	Lamotrizine	Inactivation of voltage activated Na^+ channels	Ataxia, Diplopia
9	Cyclic GABA Derivatives	Gabapentin	Increase GABA – A release	Sedation, triedness
10	Newer drugs	Vigabatrin	Inhibition GABA transaminase	Psychosis
11		Topiramate	Prolongation of inhibitory action of GABA – A.	Word finding difficulties, renal stone
12		Tiagabine	Inhibition GABA transporter GAT - 1	Nervousness, abdominal pain
13		Levetriacetam	Binding affinity to synaptic vesicle protein SVZA	Somnolence
14		Zonisamide	Inhibition of T – type of Ca^{++} current	Somnolence, Renal Caliculi

Herbal Anti-convulsant agents

Although many medicinal plants have been used in the effective treatment and / or management of epilepsy in India, only a few of the Indian folk medicinal plant have been examined scientifically for their medicinal values.The core aim of this project is to review, pharmacotherapeutic acting agents used in traditional folk medicines. Some of the Indian medicinal plants like *Withania somnifera* (Ashwaganda), *Delphinium denudatum* (Jadawar), *Centella asiatica* (Brahmi), *Acorus calamus* (Vaca), *Butea monosperma* (Palash), *Mimosa pudica* (Chuimui), *Cuminumcyminum* (Zira), *Emblicaofficinalis* (Amla), *Bacopamonnieri* (Brahmi), *Albizzia lebbeck* (Siris), *Rauwolfia serpentina* (Sarpgandha), *Ocimum sanctum* (Tulsi), *Nardostachysjatamansi* (Jatamansi), *Valerianaofficinalis* (Common valerian), *Panax ginseng* (annag), *panaxquinquifolium* (American ginseng), *Cassia sophera* (Kasaunda), *Ocimum gratissimum* (Ban tulsi), *Hypericumperforatum* (Goat weed), *Matricariachammomila* (Sutagul), *Annona muricata* (Mamphal), *Moringaoleifera* (Sahjan); that are frequently used as antiepileptic remedies in Indian folk medicines, are included in this heading.

In India many plants have been used from years, for the prevention and treatment of epilepsy. About 137 such Indian plants have been included in this literature with the hope that better medicines may be developed, in future, for the treatment of Epilepsy. In this heading, the vernacular names (in Hindi) of the plants, their morphological parts commonly used in Indian medicinal system as antiepileptic and / or anticonvulsant remedies and their geographical distribution in India, are summarized.The present study is aimed at providing data on the ethnobotanical and ethnomedicinal applications of plants used as anticonvulsant. Attempt is made to also provide the most acceptable scientific and local names for the various species. This information is further intended to contribute in the documentation and provision of accurate record of indigenous knowledge, distribution and chemical constituent of these plants, and their subsequent integration in the efforts towards the plant parts and their activity in anticonvulsant models.Information on ethnomedicinal applications, of the plant species used as anticonvulsant are inadequate or completely lacking.The data on the correct identification including common - botanical and local names, distribution, plant parts used their chemical constituents and their anticonvulsant activities are summarized in Table.

S.No	BOTANICAL NAME	VERNACULAR NAME(HINDI)	CHEMICAL CONSTITUENTS	REFERENCES
1	*Acorus calamus*	Bach	Asarone ,β-asarone	Sharma et al., 1961; Muherjee et al.,2007; Gupta ,et al.,2004.
2	*Adhatoda zeylanica*	Arusa ,rakas	Vasicine ,vasicinone,vasicinine(alkaloids)	Sharma et al., 2000.
3	*Aegle marmelos*	Bel	Marmelosin(impertorin)and essential oils	Kritikar et al.1999.
4	*Albizzia lebbeck*	Siris	Sapogenin – echinocystic acid	Gupta et al., 2004.
5	*Allium cepa*	Pyaj	Allin, allylpropyl-disulphide.	Sharma et al., 2004
6	*Allium sativum*	Lahasun	Scordinine A,A_1,A2 &B, dialyldisulphide,diallyltrisulphide	Sharma et al., 2004.
7	*Anacylus pyrethrum*	Akarkra	Alkaloids –pyrethrin ,essential oils	Kapoor et al., 2005.
8	*Annona squamosa*	Seetaphal	Aetogenins such as squamocin ,squamostatin -A	Saluja et al., 1994.
9	*Apiumgraveolens*	Ajmoda ,ajmod	Anthoxanthine glycosides – graveobioside A.	Mario et al., 1997.
10	*Asaramhimalicum*		Methyleugenol	Rastogi et al., 1990-1994.
11	*Bacopamonnieri*	Mandukparni ,brahmi	Saponins-hersaponin ,bacoside A & B.	Ganguly et al,1967
12	*Benin casa hispida*	Golkaddu	Protein ,carbohydrates ,mineral matter	Kapoor, et al.,2005.
13	*Boerhaviadiffusa*	Biskhfra,sunt	Punarvoside ,rotenoids and lignanas	Sharma et al., 2000.
14	*Borassusflablellifer*	Tad	Galactomannans	Gupta et al., 2004.

15	*Bupleurumflacatum*	Saiko	Saikosaponins	Palker et al.,1984.
16	*Butea monasperma*	Palas, dhak	Palasonin, aleurilic and fatty acids	Sharma et al.,2000.
17	*Calophyllumelatum*	-	Calophyllolide	Rastogi et al.,1970-1979.
18	*Cannabanis sativa*	-	cannabidiol	Rastogi, et al.,1980-1984.
19	*Careyaarborea*	Kumbhi	Lubeol ,α-spinasterol,α-spinasterone	Sharma et al.,2004.
20	*Carthamustinctorius*	Kusum	Myristoleo-linolein ,palmitooleolinolein	Rastogi et al., 1985-1989.
21	*Carumcarvi*	-	α,β- epoxy carvone	Almedia et al., 2008.
22	*Cassia occidentalis*	-	Chrysophanic acid	Rastogi et al., 1970-1979.
23	*Catharanthuspusillus*	-	Vindoline,dimethoxyvindoline	Sharma et al., 2004.
24	*Cedrusdeeodra*	Debdar ,deyodra	Dihydromyricetin ,cedrine,deodorin.	Sharma et al., 2005.
25	*Celastrruspaniculatus*	Malkangani	Malkanguninpaniculatadiol,	Gaitonde et al., 1957
26	*Commiphorawightii*	Guggul	Quercetin ,guggulsterols-1,2,3	Sharma et al., 2005.
27	*Convolvulus prostratus*	Shankhapushpi	Microphylicacid,shankhpushpine	Sharma et al., 2005.
28	*Crocus sativus*	Kesar	Crocin ,crocetin,picrocrocin	Hosseinzadeh et al, 2002.
29	*Curcuma longa*	haldi	Curcuminoids(6%), essential oils(2-1%)	Bharal et al, 2008
30	*Cymbopogonmartinii*	Gandharel ,rusaghas,rolis	Carvone , palmrosal oil ,α-pinene	Quintans et al, 2008
31	*Cynodondactylon*	Dub ,dub grass	Triterpinoids,alkaloids-ergonovine,	Pal et al., 2008;
32	*Cyporusrotundus*	Motha	Sesquiterpeneketones(mustakone),pinene,cineol	Sharma et al., 2005.
33	*Delphinium denudatum*	-	Diterpenoid alkaloid-brumonine;lycaconitine,delvestine	Rastogi et al., 1985-1989.
24	*Desmodiumtrifloru m*	-	Hyphorine ,trigonelline	Rastogi et al., 1970-1979.
35	*Digitalis lanata*	-	Digoxin	Rastogi et al., 1990-1994.
36	*Erythrinavariegata*	Dadap ,pharhod	Isoquinoline alkaloids	Jesupillai et al.,
37	*Fumaria indica*	Pitparpara	Aldumidiceine ,(-)aldumine,	Sharma et al., 2005
38	*Glycyrrhiza glabra*	Mullhatti ,mulethi	Glycyrrhizine ,liquiritigenin	Ambawade et al, 2002
39	*Gossypumherbaceum*	Kapas ,rui	Polysaccharides ,glycoproteins	Sharma et al., 2005.
40	*Hedesmusindicus*	Salsa ,kapooree	Desinine and rutin ,	Sharma et al., 2000.
41	*Hisbiscus rosa sinensis*	Jasut ,gurhal	Traxcryl acetate ,hentriacontane	Sharma et al., 2002; Kasture et al., 2000.
42	*Indigoferatinctoria*	Nili	Galactomannan	Sharma et al., 2004.
43	*Melilotusofficinalis*	-	Coumarin	Rastogi et al., 1970-1979.
44	*Morus alba*	-	Root bark	Rastogi et al., 1970-1979.
45	*Myristica fragrans*	Jaiphal ,jayphal	Safrole ,eugenol,elemicin,trymyristicin	Sonavane et al, 2002; Sharma et al., 2002.
46	*Nardostachysgrandiflora*	Balchar ,jatamansi	Jatamols A &B,jatamansic acid	Vidya et al., 2005
47	*Nelumbonucifera*	Kamal	Nuciferine ,nelumboside	Sharma et al., 2002.
48	*Nerium oleander*	-	Cardenolidestriolides ,biosides.	Rastogi et al., 1990-1994.
49	*Nigella sativa*	-	Thymoquinone	Hosseinzadeh et al, 2004
50	*Ocimum gratissimum*	Ban tulsi, ram tulsi	Eugenol,cineole	Freire et al., 2003.
51	*Ocimum sancatum*	Tulsi	-	Jaggi et al.,2003.
52	*Opuntia vulgaris*	-	Saponins	Pal et al, 2005.
53	*Pandanusfescicularis*	Kewda ,kewra	Essential oils like cineol and	Sharma et al., 2005.
54	*Papaversomniferu*	-	Morphine	Rastogi et al., 1980-

	m			1984.
55	*Pinusrxburghii*	Salla ,chir	Sesquiterpenes, flavanoids-pinosylvin	Sharma et al., 2004.
56	*Piper longum*	Pipli ,pipal	Piperlonumine and piperlonuminine,piperine	Sharma et al., 2005
57	*Psidiumguajava*	Amrod	Sesquiguavaene ,triterpeniods,jacoumaric acid	Sharma et al., 2004.
58	*Psoraleacarylifolia*	Bakchi ,babchi	Psoralen ,isopsoralen	Sharma et al., 2005.
59	*Pterocarpussantalinus*	Raktachandana	Santalin A &B,isopterocarpone,pterocarpal	Sharma et al., 2005; Rastogi et al., 1970-1979.
60	*Raphanus sativus*	Muli	β-sitosterol ,raphamusola,ferulicand caffeic acids	Sharma et al., 2002.
61	*Rauvolfia serpentina*	Chotachand ,chadamarva	Reserpine ,rubasine ,ajmalicine,rescinnamine	Charveron et al., 1984.
62	*Rubusellipticus*	Hinsalu	Octacosanol,octacosanoic acid	Rastogi et al., 1990-1994.
63	*Sapinduslaurifoliu s*	Ritha	Emarginatosides b &c,hederagenin	Sharma et al., 2004.
64	*Sesbaniagrandiflora*	Agast ,basna	Grandifloral ,kaempferol	Veena et al., 1999; Sharma, et al., 2005.
65	*Smilax zeylanica*	-	Dioscin ,smilagenin ,sarsapogenin	Madhavan 2008.
66	*Solanumkhasianum*	-	Solasodine ,diosgenin	Rastogi et al., 1970-1979.
67	*Solanumviginianum*	Ramgani ,kateli	Carpesterole ,gluco-alkaloid solenocarpine	Madhvan et al., 2008; Sharma et al., 2002.
68	*Stephina glabra*	-	Gindarine	Rastogi, et al., 1970-1979.
69	*Strychnusnuxvomica*	Kuchla	Alkaloids stychinine ,brucine	Kapoor et al., 2005.
70	*Swertiaciliata*		Gentianine ,swertianolin	Rastogi et al., 1970-1979.
71	*Syzygiumaromaticum*	Laung	Isobiflorin ,biflorin,eugenol,acetyleugenol	Sharma et al., 2002.
72	*Taxus baccata/t.wallichiana*	Birmi ,thuno	Ephedrine ,sequoiaflavonebetuloside	Nisar et al., 2008;
73	*Termineliachebula*	Mara ,marod	Anthraquinone glycosides ,chebulinic acid	Sharma et al., 2005.
74	*Tribulusterrestris*	Gokhru	Chlorogenin ,diosgenin ,astragalin	Sharma et al., 2005.
75	*Viola odorata*	Banaphsa	Alkaloid-violine ,glycoside – violaquercitine.	Kapoor et al., 2005.
76	*Vitex negundo*	Samhalu ,nirgand	Henteriacontane ,β-sitosterol,stigmasterol	Tendon et al., 2005; Sharma et al., 2005.
77	*Withania somnifera*	Asgandh	Withniol ,withanine ,somniferine(alkaloids)	Kumar et al, 2008; Sharma et al., 2005.
78	*Zanthoxylumarmatum*	Darmar ,tejphal	B-phellandrene,amino acids,α and β amyrin	Sharma, et al., 2005.

SUMMARY AND CONCLUSION

Epilepsy is characterized by unprovoked, recurring seizures that distrupt the nervous system and can cause mental and physical dysfunction. It is not a single disorder but rather a wide spectrum of problems.There are approximately 50 million people with epilepsy worldwide, and approximately 40% of them are women. Women with catamenial epilepsy have seizures clustered around their monthly cycle. However, currently there is no specific treatment for this neuroendocrine condition. The cause of catamenial epilepsy is unknown. But it must be uncovered in order to develop prevention and treatment techniques, and neurosteroids seem to play a clear role in increased seizure susceptibility. Several antiepileptic drugs are used in cataminial epilepsy therapy. However, catamenial seizures are not successfully treated currently with those conventional antiepileptic drugs. The drugs used to control epilepsy may also affect a woman's hormones. There is little information to whether catamenial seizures in humans really represent an epileptogenic process or are merely an exacerbation of existing seizure disorder.

It is suggested that because of repeated triggers due to withdrawl cycles, some women might develop epileptogenicity resulting in eatamenial epilepsy, while catamenial seizure exacerbation could be described to neurosteroid withdrawl in preexisting epileptic condition. However there is no validated model to prove this hypothesis on the development of catamenial seizures. Much has been learned about this disease, but there is much more that is yet to be learned.Many herbals and dietary supplements may predispose to seizures in individuals without epilepsy and worsen seizure control in those with epilepsy.After study of various books and generals we can say that: Some herbal medicines may have an anticonvulsant effect; however, none has been scientifically tested in randomized blinded controlled studies.

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