



A REVIEW ON SOUTH INDIAN MEDICINAL PLANTS EXPLOITED FOR TREATING EPILEPSY

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Abstract

Epilepsy is a neuropsychological disorder, caused due to discharge of neurotransmitter. The current therapy of epilepsy with modern antiepileptic drugs (AEDs) is associated with side effects, dose-related and chronic toxicity, as well as teratogenic effects, and approximately 30% of the patients continue to have seizures with current antiepileptic drugs therapy. India has a rich history of medicinal herbs used for treating various diseases. India is known as the emporium of Medicinal plants due to the occurrence of several thousands of medicinal plants in the different bioclimatic zone. The aim of the present study was to highlight the some plants of south India such as *Acacia farnesiana* (L) wild, *Alstonia venenata* R.Br, *Musa paradisiacal* L, *Cymbopogon citrates*(DC.) Stapf, *Catharanthu spusillus*(Murr.) G.Don exploited for treating epilepsy. The antiepileptic role of such plants with specific properties of their parts has been listed in traditional texts and not yet used for validating anti-epileptic potential. Hence, the present study concludes that the given plants were copiously found in south Indian bioclimatic zone that can be explored to ascertain antiepileptic activity.

Keywords

Acacia farnesiana (L) wild, *Alstonia venenata* R.Br, *Musa paradisiacal* L,
Cymbopogon citrates (DC.) Stapf, *Catharanthus pusillus*(Murr.) G. Don, Epilepsy.

Introduction

Epilepsy is one of the most widespread diseases of the brain, distressing at least 50 million persons global¹. Epilepsy is a chronic and often progressive disorder characterized by the episodic and random occurrence of epileptic seizures which are rooted by an atypical discharge of cerebral neurons. Several types of seizures can be acknowledged on the basis of their clinical phenomena.² Seizures are basically divided into two major groups: partial and generalized. Partial (focal, local) seizures are clinical or electrographic evidence exists to put forward that the attacks occur in a confined area of the brain, usually in a portion of one hemisphere, while generalized seizures are those in which evidence for a localized onset is missing. Partial seizures are further subdivided into simple partial, intricate partial and partial seizures evolving to secondarily generalized seizures, while generalized seizures are categorized into absence (nonconvulsive), myoclonic, clonic, tonic, tonic-clonic and atonic seizures. In addition to classifying the seizures that occur in patients with epilepsy, patients are classified into appropriate types of epilepsy or epileptic syndromes characterized by different seizure types, etiologies, ages of onset and electroencephalographic (EEG) features³. There are different causes of epilepsy that are common in certain age groups. These are: 1) for the period of neonatal and early infancy, the causes include hypoxic ischemic encephalopathy, CNS infections, trauma, congenital CNS abnormalities and metabolic disorders. 2) At late infancy and early childhood, febrile seizures, CNS infection and trauma etc. 3) for the duration of childhood, well defined epilepsy syndromes are caused. 4) In adolescence and adulthood, idiopathic epilepsy, trauma, CNS infections, brain tumors, illegitimate drug use and alcohol withdrawal. 5) In older adults, cerebrovascular diseases is a general cause and other causes are CNS tumors, head trauma, and other degenerative diseases that are common in the older age group, such as dementia. About 5% of the world population develops epilepsy in their lifetime whereas overall occurrence rate of epilepsy in India is 5.59 per 1000 population.⁴ Anticonvulsant drugs are used to control the convulsions by inhibiting the discharge and then producing hypnosis. Various synthetic drugs, viz. sodium diphenyl hydantoin (Dialtin), barbiturates, pyrimidon, succinamides, diazepam etc. are used for the treatment. The recent therapy of epilepsy with modern antiepileptic drugs (AEDs) is related with side effects, dose-related and chronic toxicity, as well as teratogenic effects, and approximately 30% of the patients continue to have seizures with current antiepileptic drugs therapy.⁵

India has a rich account of traditional plants used for treating different diseases. India is recognized as a large retail store of therapeutic plants due to the occurrence of numerous medicinal

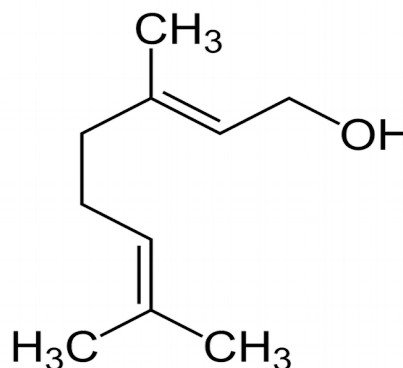
plants in the different bioclimatic zone. Ayurveda and siddha systems of medicine are the traditional heritage of India. Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need.⁶ Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects.⁷ Several plants used for the treatment of epilepsy in different systems of traditional medicine have shown activity when tested in modern bioassays for the detection of anticonvulsant activity⁸ and many such plants are yet to be scientifically investigated. In the present study some traditional plants from India with a medicinal claim of anti epileptic activity and anticonvulsion properties were reviewed. This study was undertaken to evaluate the anticonvulsant and sedative properties of few medicinal plants used in the treatment of insomnia and epilepsy in different parts of the world.

***Acacia farnesiana* (L) wild**

Acacia farnesiana a species of shrubs and trees belonging to the family Leguminosae. Thorny shrub or small tree up to 8 m tall. Leaves pinnate, pinnate 5 pairs, Leaflets 10-15 pairs, elliptic, overlapping. Flower heads creamy, white, fragrant. Fruit sub-cylindric, dehiscent, slightly curved.



Geraniol



Taxonomy

- Kingdom** : Plantae
Order : Fabales
Family : Fabaceae/Leguminosae (Pea family)
Genus : Vachellia Wight & Arn. – acacia
Species : Vachelliafarnesiana (L.) Wight & Arn. – sweet acacia

Synonym

Mimosa farnesiana L; *Pithecellobium minutum* M.E. Jones; *Vachellia densiflora* Alexander ex

Small

Vernacular Names

Tamil : Kadivel, Kasthurivel, Kasturivelam,

English : Cassie flower, Cassie, Sweet acacia,

Distribution: Native of tropical South America, now Pan Tropical, distributed in India, Pakistan, Nepal, Sri Lanka, Maldives, Myanmar and Andaman Islands. In India, it is found growing in tropical parts, particularly in sandy soils of river beds in northern India and parts of Tamil nadu.

Parts used : Bark, leaves, heart wood, gum, roots

Medicinal uses

Bark is astringent, demulcent and is used for malaria. Leaves are useful for eye complaints and gonorrhoea. Inflorescence is used for venereal diseases and root for anti infertility. The plant is given for carbuncle, cholera, diarrhoea, convulsions, delirium, epilepsy, madness, rabies, sores and sterility in women. The plant works as an antiseptic agent for curing sores, gums and loose teeth.⁹

Active Constituents

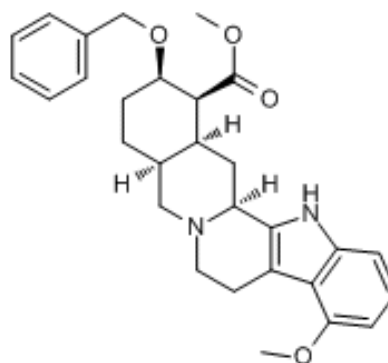
Chemical compound found in *Acacia farnesiana* (L) wild yielded Methyl salicylate, anisaldehyde, geraniol, nonadocane and benzaldehyde¹⁰.

Alstonia venenata R.Br

The plant *Alstonia venenata* R.Br belongs to the family Apocynaceae. It includes totally 43 species of which two species namely, *Alstonia venenata* R. Br. are represented in South India¹¹. Small tree, up to 4 m tall. Leaves in whorls, oblong-lanceolate. Flowers white in terminal, sub-umbellate, dichotomous cymes. Fruit follicular, up to 12cm long, seeds with tuft of hairs.



Alstovenine



Taxonomy

Kingdom : Plantae

Order : Gentianales

Family : Apocynaceae
Genus : *Alstonia*
Species : *A. venenata*
Synonym

Blaberopus venenatus (R.Br.) A.DC; *Echites venenatus* Roxb.exA.DC.

Vernacular Names

Tamil : Sinnappalai

English : Devil Tree

Distribution: It grows as a shrub or small tree in low to mid elevation deciduous forests of India.

Parts used : Bark, Fruit, Root.

Medicinal uses:

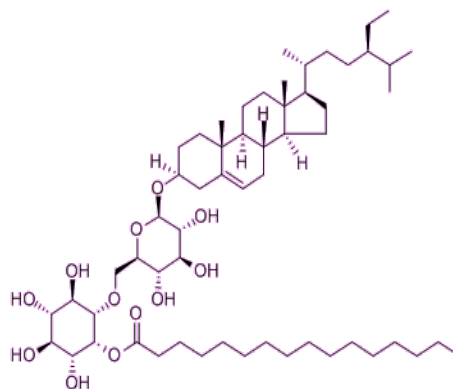
The ripe fruits are stated to possess tonic and anthelmintic properties and are reported to be used as a remedy for impure blood, Syphilis, insanity, and epilepsy (Alstovenine – CNS Stimulant),gastrointestinal ailments, joint pain, for chronic and acute skin disorders. It also has laxative and anti-inflammatory properties, Antifungal activities ¹².

Active Constituents

Chemical compounds found in *Alstonia venenata* R. Br such are Reserpine and indole alkaloids, Venenatine, Isovenenatine, Alstovenine, Reserpin, Venoxidine, Kopsinine have been identified from stem bark ¹³and 16-Epivenenatine and 16-Epialstovenine 5-methoxy-1-oxo-tetrahydro- β -carboline, Venenatine, Alstovenine, Venoxidine and Dioxokopsane were identified from root bark¹⁴. Antifungal activity from the plant indole alkaloid Venenatine¹⁵ and quaternary alkaloid Δ^3 -alstovenine ¹⁶ and have been studied. Venoterpene and Echitoserpidine ¹⁷ fruit alkaloids have been identified. Alkaloids of the leaf are Alstolenine, 20-dihydropolyneuridine, deacetylakaummiline, polyneuridine and raucaffrinoline ¹⁸.

***Musa paradisiaca* (L)**

Musa paradisiaca L. (Musaceae) are mainly grown in the tropical and subtropical countries and are widely used for its nutritional values all over the world. *Musa paradisiaca* (L) is a herbaceous plant (up to 9 m long) with a robust treelike pseudo- stem, a crown of large elongated oval deep-green leaves (up to 365 cm in length and 61 cm in width), with a prominent midrib, each plant produces a single inflorescence like drooping spike, and large bracts opening in succession, ovate, 15-20 cm long, concave, dark red in color and somewhat fleshy. Fruits are oblong, fleshy, 5-7cm long in wild form and longer in the cultivated varieties.



Taxonomy

- Kingdom** : Plantae
Order : Zingiberales
Family : Musaceae
Genus : Musa
Species : paradisiacal

Synonym

Musa sapientum var. *paradisiaca*; *Musa discolor* planch; *Karkandela malavarica* Raf.

Vernacular Names

- Tamil** : Vazhei
English : Banana tree

Distribution: In different countries about 300 varieties of bananas are grown, of which a vast majority have been growing in Asian, Indo-Malaysian and Australian tropics and are now widely found throughout the tropical and subtropical countries. India, Philippines, China, Brazil, Indonesia, Mexico, Colombia, Thailand are the top banana producing countries

Parts used : Leaves, Pseudostem (Rhizome)

Medicinal uses

The fruit of *Musa paradisiaca* is traditionally used in diarrhoea (unripe), dysentery, intestinal lesions in ulcerative colitis, uremia, nephritis, gout, hypertension, cardiac disease. Flowers: Used to treat dysentery, ulcers, and bronchitis. Cooked, flowers are considered a good food for diabetics. Sap: Chemically, banana sap has astringent qualities. In traditional medicine, the sap is used to treat a wide variety of ailments, including leprosy, hysteria, fever, digestive disorders, hemorrhage, epilepsy, hemorrhoids, and insect bites. Roots and Seeds: Treat digestive disorders Peel and Pulp:

Scientifically shown to have both antifungal and antibiotic components ¹⁹.

Active Constituents

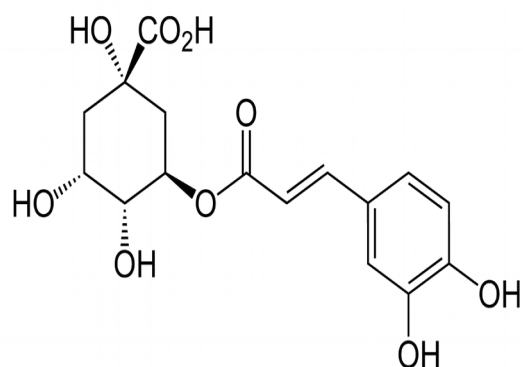
Chemical compound found in *Musa paradisiaca* Leucocyanidin, quercetin, Sitoindoside I, II, III, IV ²⁰

Cymbopogon citrates (DC) Stapf

Cymbopogon citrates (DC) Stapf staff is popularly known as citronella grass or lemongrass. This species belongs to the Poaceae (Gramineae) family. It is tall, tufted perennial grass with a short rhizome. Leaf blades linear, Sheath terete. Flowers in spikelets in loose panicles. The fragrant leaves are the part that is used as flavoring. Leaves are steam distilled to extract lemongrass oil.



Cholorogenic Acid



Taxnomy

Kingdom : Plantae
Order : Poales
Family : Poaceae
Genus : Cymbopogon
Species : C. citratus

Synonym

Cymbopogon flexuosus; *East Indian lemongrass*; *Andropogon citrates* DC

Vernacular Names

Tamil : Karppurappul
English : Lemon grass

Distribution: Lemon grass is native to India, Sri Lanka and South-East Asia. It is found growing naturally in tropical grasslands. It is also extensively cultivated throughout tropical Asia.

Parts used : Lemongrass Leaves, Lemongrass Oil.

Medicinal uses

The plant is aromatic, bitter, acrid, antihelmintic, laxative, appetizer alexipharmic and aphrodisiac and is useful in helminthiasis, flatulence, gastric irritations, anorexia, poisonous bites, bronchitis, epilepsy, leprosy, skin diseases, cholera, neuralgia, sprains and fever, antibacterial²¹, antifungal²², antiprotozoal²³, anti-carcinogenic²⁴, anti-inflammatory²⁵, antioxidant²⁶, cardioprotective²⁷, antitussive, antiseptic, and anti-rheumatic activities. It has also been used to inhibit platelet aggregation²⁸, treat diabetes²⁹, dyslipidemia, gastrointestinal disturbances³⁰, anxiety³¹, malaria³², flu, fever, and pneumonia³³, as well as in aromatherapy

Active Constituents

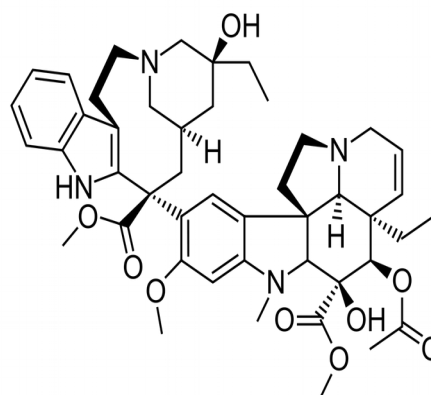
Chemical compound found in *Cymbopogon citratessaponins*, tannins, flavonoids, alkaloid, phenols, and anthraquinones. Citral, myrcene, geraniol, limonene, burneol, citronellol, nerol, neral, α -terpineol, elemicin, caffeic acid, apigenin, luteolin, kaempferol, quercetin, chlorogenic acid³⁴.

Catharanthus pusillus (Murr.) G. Don

Catharanthus pusillus (Murr.) G. Don is belonging to the family Apocynaceae. Annual erect herb, to 30cm tall, branchlet sterete below, quadrangular above. Leaves lanceolate, glabrous. Flowers white in terminal or axillary 5-7 flowered corymbs. Fruit capsule, seeds black.



Vinblastin



Taxonomy

Kingdom : Plantae
Order : Gentianales
Family : Apocynaceae
Genus : Catharanthus
Species : C. pusillus
Synonym

Lochnera pusilla (Murray) K.Schum; *Vinca parviflora* Retz; *Vinca pusilla* Murray

Vernacular Names

Tamil : Milagaipoondu

English : Tiny Periwinkle, Tiny Vinca

Distribution: Occasional weed in cultivated fields throughout the greater part of India.

Parts used : Whole plant

Medicinal uses

The plant possesses oncolytic properties. A decoction of the dried plant boiled in oil is used in the treatment of lumbago. Whole plant used in paralysis, Epilepsy and ulcers. Anaesthetic, Anti-inflammatory, Anticancer, Anti-malarial, Anti-viral and Anti-bacterial properties³⁵.

Active Constituents

Chemical compound found in *Catharanthus pusillus* are alkaloids, cyanogenic glycosides, glucosinolates, flavanoids, saponins, steroids and terpenoids, vinblastin and vincristine³⁶.

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. In the present review article, selected plants reported to possess anticonvulsant activity. Thus, it is the wish of the instigators that this review article will stimulate the interests in further investigations on isolation of active constituent that could be used as antiepileptic agents.

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