A Review of Some Medicinal Plants Used for Nervous Disorders

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ABSTRACT

Use of plants for curing human ailments is an ancient practice. Recently, there is revival of interest. Ethnobotanical field surveys were done from different parts of developing countries of the world. It reflects concern about the possible loss of valuable information on traditional medicine. Neurological disorders are often not considered common diseases. They are mental illness like epilepsy which is the most serious chronic disorder affecting millions of people. Other’s like Parkinson’s, Alzheimers, Meningitis and Stroke nervous disorders also affects speaking, movement, breathing, mood and memory. Herbal medicines are a holistic medium. Growing of these important herbs will add to the terrestrial diversity of the ecosystem and help in conservation of Biodiversity. Centella asiatica, Avena sativa, Lagenaria sicerana, Cassia tora and Cassia fistula are some of the important plants used in nervous disorders. The different medicinal plant varieties can be studied with biochemical properties and a taxonomic classification can be made based on medicinal uses and biochemical relationship drawn. Tissue culture studies along with molecular characterization can also be done. Important germasm of the medicinal plants will add to the terrestrial biodiversity and the most effective medicinal plant used for nervous disorder can be obtained.

Keywords: Nervous disorders, medicinal plants, biodiversity, ethnobotany, mental illness.

INTRODUCTION

Most of the population depends on traditional medicine for primary health care, however, neurological disorders are often not considered as common diseases and many people with mental illnesses, like epilepsy, are severely affected by health related stigma and discrimination. Epilepsy is the most common serious chronic brain disorder, estimated to affect at least 10 million people. Others like Parkinson’s, Alzheimers, Meningitis and Stroke nervous disorders also affects speaking, movement, breathing mood and memory. In addition, neurological disorders affect the brain and spinal cord.

Ethnomedicine and Ethnopharmacology can bring promising results capable of adding value to the very rich natural resources of the country. Taking into account the existing knowledge on the medicinal properties of plants for treatment of neurologic disorders, it is believed that research in the areas of ethnomedicine and ethnopharmacology is required.

Medicinal value present in tissues produces physiological action on body. Alkaloids (in the form of C, H, O and N), glucosides, essential oils, fatty oils, mucilages, tannins, gums are present in the plants.

Use of Plants for Curing Human Ailments is an Ancient Practice

Recently, there is a revival of interest. It reflects concern about possible loss of valuable information on traditional medicine.

Most population depends on traditional medicine for primary health care and as such the study of medicinal herbs is essential (Sinha, 1997). Plants used in nervous disorders include:
1) Nervous disorders: *Avena sativa, Aegle marmelos* and *Acorus calamus*;
2) Hypochondria: *Aegle marmelos*;
3) Epilepsy: *Datura metel, Emblica officinalis, Evolvulus alsinoides, Ferula asafoetida* and *Cassia fistula*;
4) Melancholia: *Aegle marmelos*;
5) Hysteria: *Valeriana*;
6) Mania: *Datura*;
7) Depression: *Annona squamosa*;
8) Insanity: *Datura metel, Bacopa monnieri* and *Anacardium occidentale*;
9) Sedative: *Annona muricata*;
10) Anxiety: *Bacopa monnieri* and *Rosmarinus officinalis*;
11) Hypnotic: *Annona muricata*;
12) Insomnia: *Biophytum*;
13) Hysteria: *Cassia occidentalis*;
14) Narcotic: *Papaver somniferum*;
15) Paralysis: *Strychnos nux vomica*;
16) Hypnotic: *Hyacynus niger*;
17) Stimulant: *Panax ginseng*;
18) Neuralgia: *Aconitum napellus*;
19) Increases brain power: *Loranthus longifera*;
20) Anxiety: *Rauwolfia serpentine*.

Parts of plants used for medicinal purpose include:

- *Datura metel*: Root;
- *Papaver somniferum*: Dried juice and latex of unripe capsule;
- *Strychnos nux vomica*: Seeds;
- *Hyoscyamus niger*: Leaves, flower tops and seeds;
- *Valeriana*: Essential oil and root;
- *Panax ginseng*: Root;
- *Bacopa monnieri*: Leaf;
- *Ferula asafoetida*: Root;

**LITERATURE REVIEW**

**Rauwolfia serpentina**

In *Rauwolfia*, the root is used in humans to treat hypertension and insanity. It is also used for relief of central nervous disorder including anxiety and excitement (Erheni and Obadoni, 2015). It is also used for insomnia, mental disorders and aggressive behavior. It calms the central nervous system and reduces anxiety, irritability and aggression. It can be used for the treatment of schizophrenia, epilepsy, psychosis and other mental disorders (Jagdev, 2016).

**Aegle marmelos**

In *A. marmelos*, various studies have shown the presence of flavonoids in phytochemical screening which are responsible for anxiolytic effect through benzodiazepine receptors. Therefore, flavonoids present in *A. marmelos* may be responsible for the anti-anxiety activity. Various studies on *A. marmelos* have shown the presence of phyto constituents other than flavonoids like tannic acid, phenols, marmesinin, ascorbic acid, eugenol, skimmianine and saponin etc which may possess anxiolytic properties. *A. marmelos* can be a safe and effective drug for the treatment of a number of anxiety disorders. The fruit contains ethanolic extracts. These are used to care for fatigue, anxiety and depression. The fruit has steroids, coumarin and alkaloids.

**Rosmarinus officinalis**

*R. officinalis* L. has several therapeutic applications in folk medicine in curing or managing a wide range of diseases including depression. The extract of *R. officinalis* produced an anti-depressant like effect, since the acute treatment of mice with the extract reduced the immobility time swimming test and tail suspension test in mice as compared to control. The results suggest that the anti-depressant action of *R. officinalis* is mediated by an interaction with the monoaminergic system and that this plant should be further investigated as an alternative therapeutic approach for the treatment of depression (Daniele, 2009). Rosemary diterpenes have been shown in recent years to inhibit neuronal cell death induced by a variety of agents both *in vitro* and *in vivo*. The multifunctional nature of the compounds from the general antioxidant-mediated neuronal protection to other specific mechanisms including brain inflammation and amyloid beta formation is discussed (Habtemariam, 2016).

**Evolvulus alsinoides**

Bioactivity guided purification of n-BuOH soluble fraction were from two new compounds, 2,3,4-trihydroxy3methylbutyl 3-2 propeonate and 1,3 –di-O-cafeoyl quinic acid methyl ester along with 6 known compounds, caffeic acid,6-methoxy-7-O-beta-glucopyranoside coumarine, 2-C-ethyl erithritol and kaeferol-7-O-beta-glucopyranoside. The structure of new compounds was elucidated by spectroscopic analysis, while known compounds were confirmed by direct comparison of their NMR data with those reported in literature. This is the first report of the presence of phenolic constituents in *E. alsinoides* (Prasoon, 2007).

*E. alsinoides* is an effective nootropic agent and mainly indicated in loss of memory, sleeplessness and treatment of epilepsy (Anupama, 2016). The isolated compounds were screened for anti-stress activity in acute stress induced biochemical changes in adult male Sprague-Dawley rats.
Stress exposure has resulted in significant increase of plasma glucose, adrenal gland weight, plasma creatine kinase and corticosterone levels. The compounds displayed most promising anti-stress effect by normalizing hyperglycemia, plasma corticosterone and adrenal hypertrophy.

**Avena sativa**

* A. sativa is mainly used for spasmodic and nervous disorders with exhaustion. Cardiac weakness, spermatorrhea problem and nervous debility of convalescence are common symptoms of homeopathic *A. sativa*. (Shastho Totho). In male function neurasthenia, homeopathic *A. sativa* has a selective influence upon the nerve system of the genitor-urinary apparatus due to its selective power on the total nervous structure which supplies the reproductive organs. Nervous palpitation of the heart, insomnia, nervous excitement and mental weakness or failure and general debility caused by masturbation can be easily removed using this remedy.

**Datura metel**

Producing and selecting interspecific hybrids of *Datura* for high scopolamine production was successfully done. The leaves of *D. metel* contain 0.2 to 0.5% tropane alkaloids, the flowers 0.1 to 1.0% and the seeds 0.2 to 0.5%. Scopolamine is a major constituent in mature leaves. Other alkaloids are hyoscyamine, norhyoscyamine, norscopoline, hydroxyl-6-hyoscyamine and metelodine. They increase the heart rate, induce relaxation and motor inhibition in smooth muscles, decrease secretions and induce dilation of the pupils of the eyes. *In vitro* production of scopolamine and hyoscyamine is feasible though uneconomical. Cultures of hairy roots of *D. metel* are the most productive (Plant Resources of Tropical Africa).

**Annona**

Some neuropharmacological effects of the ethanol extract are observed in the leaves of *A. diversifolia*. Intraperitoneal administration of the extract delayed the onset of clonic seizures induced by pentylenetetrazole and delayed the time in the rota-red and swimming test. In addition, the extract augmented the duration of sleeping time induced by sodium pentobarbital. These results indicate that the ethanol extract of the leaves of *A. diversifolia* has depressant activity on the central nervous system (Gonza, 1998).

**Acoros calamus**

Chewing the rootstock of *A. calamus* plant can cause visual hallucinations, possibly because of the presence of alpha-asarone or beta-asarone. *A. calamus* shows neuroprotective effect against stroke and chemically induced neurodegeneration in rats. Specifically, it has protective effect against acrylamide-induced neurotoxicity. Both roots and leaves of *A. calamus* have shown antioxidant properties. *A. calamus* roots and rhizomes have been used in Indian system of traditional medicine for hundreds of years and it is highly valued as a rejuvenator for the brain and nervous system.

* A. calamus rhizome constituents, particularly alpha and beta asarone possess a wide range of pharmacological activities such as sedative, CNS depressant, behavior modifying, anticonvulsant, acetyl cholinesterase inhibitory and memory enhancing (Jina, 2013).

**Bacopa monnieri**

Several studies have suggested that *B. monnieri* extracts have protective effects in animal models of neurodegeneration. The herbal supplement and extract has effect on memory, anxiety and brain health. It is also used for epilepsy, nootropic substances, Alzheimer’s disease and memory improvement. It helps in anxiety reduction and attention deficit hyperactivity disorders. The whole plant standardized dry extract has role on cognitive function and affects its safety and tolerability in healthy elderly study participants. The study provides further evidence that it has potential for safely enhancing cognitive performance among the aging group (Calabrese et al., 2008).

**Ferula asafoetida**

The oleo gum resin of *F. asafoetida* has recently been found to have neuroprotective properties in animal models and humans (Sultana et al., 2015). *Asafoetida* has been used as a sedative and stimulant. It is widely used in Indian system of medicine like Ayurveda. *Asafoetida* has been held in great esteem among indigenous medicines, particularly in Unani system (Poonam, 2012).

**Embilica officinalis**

*E. officinalis* is helpful in the following health conditions: Memory loss, mental fatigue, anxiety with mental irritability and restlessness, depression with aggressive reactions and attention deficit hyperactivity disorder (Jagdev, 2017). Amla is helpful in the following health conditions: Brain and nerves-headache with burning sensation, migraine with pulsing and throbbing pain, memory loss, mental fatigue and vertigo, psychological diseases-anxiety with mental irritability and restlessness, depression with aggressive reactions, insomnia and violent mental agitation (Jagdev, 2015).
Valerian extract can cause sedation by increasing the brain’s GABA level. Gamma Aminobutyric Acid (GABA) is an inhibitory neurotransmitter, and in large enough quantities can cause a sedative effect. Results from an in vitro study suggest that valerian extract may cause GABA to be released from brain nerve endings and then block GABA from being taken back into nerve cells. In addition, Valerian’s valerenic acid inhibits an enzyme that destroys GABA, another way that valerian can improve your GABA levels and promote a great night’s rest.

Scientists have found that valerian root increases the amount of a chemical called Gamma Aminobutyric Acid (GABA) in the brain. GABA helps regulate nerve cells and calms anxiety. Drugs such as alprazolam and diazepam also work by increasing the amount of GABA in the brain. The valerenic acid and valerenol contained in valerian root extract act as anti-anxiety agents. It is pretty amazing that a herbal remedy like Valerian root can have the same anti-anxiety effects of prescription drugs without all the serious side effects of psychotropic drugs. Valeriana root have sedative and anxiolytic effects.

Cassia

The study evaluated the effect of *C. fistula* on sleeping time and level of anxiety in male albino mice. The aqueous extract of fruit increased sleeping time and decreased levels of anxiety in mice. Investigations revealed several biological activities such as anti-depressant activities of *C. occidentalis* (Manikandaselvi, 2016). Leaf poultices of *C. fistula* are also used for fascial massage in affections of the brain and applied externally in paralysis, rheumatism and gout (Rajan, 2016).

Papaver somniferum

*P. somniferum* is the species of plant from which opium and poppy seeds are derived. It is the source of natural and semi-synthetic narcotics and several pharmaceutical benzylisoquinoline alkaloids including morphine, codeine and sanguinarine. The hairy root cultures accumulated thrice more codeine than intact roots. Narcotics are used therapeutically to treat pain but they alter mood and behavior (Da Cheng, 2015).

*Strychnos nux vomica*

*Nux vomica* is a plant. The seed is used to make medicine used for nerve conditions and depression. *Nux vomica* dried seeds contains two principles alkaloids-Strychnia and Brucia. It is useful for people doing mental work or under stress (Manisha, 2010).

Hyoscyamus niger

The application areas of *H. niger* are epilepsy, meningitis and dementia. *H. niger* is a remedy with some common mental and emotional themes running through all its various expressions (David, 2009).

Panax ginseng

The root of *P. ginseng* has been a popular medicine. Ginsenosides are neuroprotective. This review considers publications dealing with the various actions of *P. ginseng* that are indicative of possible neurotherapeutic efficacies in neurodegenerative diseases and neurological disorders such as Parkinson's disease, Alzheimers disease, Huntingtons disease and amyotrophic lateral sclerosis and multiple sclerosis (Ik-Hyun, 2012). Ginseng has been used as a traditional modern medicine for over 2000 years and is recorded to have anti-anxiety, anti-depressant and cognition enhancing properties. The molecular mechanisms of the neuroprotective effects of ginseng in Alzheimers disease including beta amyloid formation, major depression and Parkinson's disease is discussed (Oug, 2015).

Aconitum

Aconite is one of the best remedies for waves of fear or outright panic. It is wild in alpine Himalayas of Kashmir and Nepal at an altitude of about 3600 m. The root is used for nervous disorders, neuralgins, dropsy and as sedative. Pure roots contain the alkaloids pseudoaconitine, chasmoaconitine, indaconitine and bихaconitine. The efficacy of the drug is based on the di-ester alkaloids - aconitin, mesaconitin and hypaconitin.

Loranthus longifolia

*L. longifolia* protects the central nervous system against electromagnetic radiation in rats. It has been widely used for the treatment of brain diseases, particularly in South West China. Hence, the present neuroprotection model was designed to investigate its neuroprotective properties against hydrogen peroxide induced oxidative stress in NG-108-15 cells. The aqueous extract exerts marked neuroprotective activity (Daniel, 2012).

RESULTS AND DISCUSSION

Several medicinal plants have been identified having properties for dealing with nervous disorders. *A. marmelos* can be a safe and effective drug for anxiolytic effects. The fruit contains ethanolic extracts. The fruit has steroids and alkaloids. There is need to further study the anti-depressant
action of *R. officinalis*, the rosemary diterpenes have shown to inhibit neuronal cell death (Daniele, 2009). Compounds have been reported from *E. asafoetidae* which are most promising in anti-stress effect by normalizing hyperglycemia, plasma corticosterone and adrenal hypertrophy (Anupama, 2016). Hybrids of *D. metel* have high scopomoline production which increases heart rate and induces relaxation in muscles and the in vitro production of scopomoline is feasible, as hairy roots of *D. metel* are the most productive.

Further work on *A. calamus* needs to be done as leaves which show antioxidant properties and has neuroprotective effect (Jina, 2013). The whole plant dry extract of *B. monnieri* has a role in cognitive function and is tolerable in elderly patients (Calabrese et al., 2008). *F. asafoetida* is neuroprotective and an indigenous medicine in Unani and Ayurveda (Poonam, 2012) which is used in household always. The molecular characterization work still needs to be done on *E. officinalis* which is helpful for violent mental agitation (Jagdev, 2015). The GABA action of *Valeriana* roots is used as a psychotropic drug without any side effect. The important fact of *P. somniferum* for mood swings is that hairy root cultures have thrice more codeine than intact roots.

Ginseng has been used for more than 2000 years and is useful as anti-anxiety, anti depressant and in Parkinson’s disease. The pure roots of Aconite contain the alkaloids for fear and panic (Ik-Hyun, 2012). *Loranthus* is neuroprotective against hydrogen peroxide induced oxidative stress (Daniel, 2012).

**Conclusion**

Certain genera like *Cassia* may be of value in conservation of drug plant resources. Further identification of medicinal plants through such classification might help in drug formulations, drug substitution and for systemizing our knowledge about medicinal plants. Family wise and disease wise break up of drug plants would systematize the survey and structure based grouping of useful plants. Geographical regions of the world are likely to yield useful information on disease incidence/distribution and variation of the pattern of plant use and diversity of a plant species is proportional to its medicinal use. Medicinal value present in tissues produces physiological action on the body. Alkaloids and glucosides can be used (Kokate, 2008). Different plant varieties need to be studied with biochemical parameters and a taxonomic classification can be made based on medicinal uses and on the biochemical relationship drawn. Tissue culture studies and molecular characterization of all the species are to be done. Important germplasm of the aforementioned plants will add to the terrestrial biodiversity and the most effective medicinal plant used for nervous disorder can be obtained.

**REFERENCES**


