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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. Ethno botanical field surveys have been 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, Alzhemirs, 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*, *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 on the biochemical relationship drawn.

Tissue Culture studies along with molecular characterization can also be done.

Important germplasm 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, Alzhemirs, Meningitis and Stroke. Nervous disorders also affects speaking, movement, breathing, mood and memory. Neurological disorders affect the brain and spinal chord.

Ethnomedicine and Ethno pharmacology 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, 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, So study of medicinal herbs is essential. (Sinha, 1997) ^[5]

Plants used in nervous disorders:

1. Nervous disorders : *Avena sativa*, *Aegle marmelos*, *Acorus calamus*
2. Hypochondria : *Aegle marmelos*
3. Epilepsy : *Datura metel*, *Emblca officinalis*, *Evolvulus alsinoides*, *Ferula asafoetida*
4. Melancholia : *Aegle marmelos*

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5. Hysteria : *Valeriana*
6. Mania : *Datura*
7. Depression : *Annona squamosa*
8. Insanity : *Datura metel*, *Bacopa monieri*, *Anacardium occidentale*
9. Sedative : *Annona muricata*
10. Anxiety : *Bacopa monieri*, *Rosmarinus officinalis*
11. Hypnotic : *Annona muricata*
12. Insomnia : *Biophytum*
13. Hysteria : *Cassia occidentalis*
14. Epilepsy : *Cassia fistula*
15. Narcotic : *Papaver somniferum*
16. Paralysis : *Strychnos nux vomica*
17. Hypnotic : *Hyacyamus niger*
18. Stimulant : *Panax ginseng*
19. Neuralgia : *Aconitum napellus*
20. Increases brain power : *Loranthus longifera*
21. Anxiety : *Rauwolfia serpentina*

Parts of plants used for medicinal purpose:

Datura metel : root

Papaver somniferum : dried juice, latex of unripe capsule.

Strychnos nux vomica : seeds

Hyoscyamus niger : leaves, flower tops, seeds.

Valeriana : essential oil, root.

Panax ginseng : root

Bacopa monnieri : leaf

Ferula asafetida : root

Aconitum : seeds

Review

Rauwolfia serpentina

In *Rauwolfia* the root is used in humans to treat hypertension, insanity. It is also used for relief of central nervous disorder including anxiety and excitement. (Erheni A H, Obadoni B O, 2015). It is used for insomnia, mental disorders, 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 Singh, 2016) [26, 33]

Aegle marmelos

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

Rosmarinus officinalis

Rosmarinus 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 antidepressant 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 a control. The results suggest that the antidepressant 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 G Machado, 2009) [15] 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. (Solomon Habtemarian, 2016) [34]

Evolvulus alsinoides

Bioactivity guided purification of n-BuOH soluble fraction from two new compounds, 2,3,4- trihydroxy-3-methylbutyl 3-2 propeonate and 1,3 -di-O-caffeoyl quinic acid methyl ester along with 6 known compounds, caffeic acid, 6-methoxy-7-O-beta-glucopyranoside coumarin, 2-C-methyl erythritol, kaemferol-7-O-beta-glucopyranoside. The structure of new compounds were 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 *Evolvulus alsinoides*. Prasoon Gupta (2007) [13]. *Evolvulus* is effective nootropic agent. It is mainly indicated in loss of memory, sleeplessness, treatment of epilepsy. (Anupama, 2016) [35]. 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 antistress effect by normalizing hyperglycemia, plasma corticosterone and adrenal hypertrophy.

Avena sativa

Avena sativa is mainly used for spasmodic and nervous disorders with exhaustion. Cardiac weakness, spermatorrhea problem, the nervous debility of convalescence are common symptoms of homeopathic *Avena sativa*. (Shastho Totho) In male function neurasthenia, homeopathic *Avena sativa* has a selective influence upon the nerve system of the genitor-urinary apparatus. Because of its selective power upon 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 *Datura metel* contain 0.2-0.5% tropane alkaloids, the flowers 0.1-1.0% and the seeds 0.2-0.5%. Scopolamine is major constituent in mature leaves. Other alkaloids are hyoscyamine, norhyoscyamine, norscopolamine, 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 *Datura metel* are the most productive. (Plant Resources of Tropical Africa)

Annona

Some neuropharmacological effects are there in effects of the ethanolic extract of the leaves of *Annona diversifolia*. Intraperitoneal

administration of the extract delayed the onset of clonic seizures induced by petylenetetrazole 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. M E Gonza lez Trujano (1998) ^[19]

Acoros calamus

Chewing the rootstock of *Acorus calamus* plant can cause visual hallucinations, possibly because of the presence of alpha-asarone or beta-asarone. *Acorus 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 *Acorus calamus* have shown antioxidant properties. *Acorus 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. *Acorus 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 Pattanaik, 2013) ^[25]

Bacopa monnieri

Several studies have suggested that *Bacopa 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, 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 in the aging. (Carlo Calabrese, 2008) ^[36]

Ferula asafoetida

The oleo gum resin of *Ferula asafoetida* has recently found to have neuroprotective properties in animal models and humans. (Asma K, 2015) ^[16]. 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 Mahendra, 2012) ^[28]

Embilica officinalis

Embilica officinalis is helpful in the following health conditions: Memory loss, mental fatigue, anxiety with mental irritability and restlessness, depression with aggressive reactions, attention deficit hyperactivity disorder. Amla is helpful in following health conditions; Brain and nerves-headache with burning sensation, migraine with pulsing and throbbing pain, memory loss, mental fatigue, vertigo. Psychological diseases-anxiety with mental irritability and restlessness, depression with aggressive reactions, insomnia, violent mental agitation. (Jagdev Singh, 2015) ^[17]

Valeriana:

Valerian extract can cause sedation by increasing brain's GABA level. GABA is an inhibitory neurotransmitter, and in large enough quantities it 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 Valeran'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 alpaolam 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. Its 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

Study evaluated the effect of *Cassia 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 have revealed several biological activities such as antidepressant activities of *Cassia occidentalis*. (Manikandaselvi V, 2016) ^[21]. Leaf poultices of *Cassia fistula* are also used for fascial massage in affections of the brain and applied externally in paralysis, rheumatism and gout. (Rajan Singh Jolly, 2016) ^[27]

Papaver somniferum

Papaver somniferum is the species of plant from which opium and poppy seeds are derived. It is the source of natural and semi synthetic narcotics. It is the source of several pharmaceutical benzyloquinoline alkaloids including morphine, codeine and sanguinarine. The hairy root cultures accumulated three times more codeine than intact roots. narcotics are used therapeutically to treat pain but they alter mood and behavior significantly. (Da Cheng Haeo, 2015) ^[30]

Strychnos nux vomica:

Nux vomica is a plant. The seed is used to make medicine. It is 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.

Hyoscyamus niger

The Application areas of *Hyoscyamus niger* are epilepsy, meningitis and dementia. *Hyoscyamus* is a remedy with some common mental and emotional themes running through all its various expressions. (David A Johnson, 2009) ^[31]

Panax ginseng

The root of *Panax 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 Parkinsons disease, Alzhemirs disease, Huntingtons disease and amyotrophic lateral sclerosis and multiple sclerosis. (I K Hyun Cho, 2012) ^[22]. Ginseng has been used as a traditional modern medicine for over 2000 years and is recrded to have antianxiety, antidepressant and cognition enhancing properties. The molecular mechanisms of the neuroprotective effects of ginseng in Alzhemirs disease including beta amyloid formation, major depression and Parkinson's disease is discussed. (Wei-Yi-Oug, 2015) ^[32]

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 3600m. Root is used for nervous disorders, neuralgias, dropsy and as sedative. Pure roots contain the alkaloids pseudoaconitine, chasmaconitine, indaconitine and bishaconitine. The efficacy of the drug is based on the di-ester alkaloids –aconitin, mesaconitin and hypaconitin. (C P Khare)

Loranthus longifolia

Loranthus longifolia protects central nervous system against electromagnetic radiation on rat. 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 Zin Hua, 2012) [29]

Discussion

Several medicinal plants have been identified having properties for dealing with nervous disorders. *Aegle marmelos* can be a safe and effective drug for anxiolytic effects. The fruit contains the ethanolic extracts. The fruit has steroids and alkaloids. There is need to further study the antidepressant action of *Rosmarinus officinalis*, the rosemary diterpenes have shown to inhibit neuronal cell death. (Daniele G Machado, 2009) [15]. Compounds have been reported from *Evolvulus alsinoides* which are most promising in antistress effect by normalizing hyperglycemia, plasma corticosterone and adrenal hypertrophy. (Anupama, 2016) [35] Hybrids of *Datura metel* have high scopolamine production which increases heart rate and induces relaxation in muscles and the *in vitro* production of scopolamine is feasible, as hairy roots of *Datura metel* are the most productive.

Further work on *Acorus calamus* needs to be done as leaves which show antioxidant properties and has neuroprotective effect. (Jina Pattanaik, 2013) [25] The whole plant dry extract of *Bacopa monnieri* has a role on cognitive function and is tolerable in elderly patients. (Carlo Calabrese, 2008) [36] *Ferula asafoetida* is neuroprotective and an indigenous medicine in Unani and Ayurveda. (Poonam Mahendra, 2012) [28] which is used in household always. The molecular characterization work still needs to be done on *Embilica officinalis* which is helpful for violent mental agitation. (Jagdev Singh, 2015) [17]. The GABA action of *Valeriana* roots without any side effects and used as a psychotropic drug. The important fact of *Papaver somniferum* for mood swings is that hairy root cultures have three times 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. (K Hyun Cho, 2012) [22] *Loranthus* is neuroprotective against hydrogen peroxide induced oxidative stress. (Daniel Zin Hua, 2012) [29]

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 likely to yield useful information on disease incidence/distribution and variation of the pattern of plant use, diversity of a plant species is proportional to its medicinal use. Medicinal value present in tissues produces physiological action on body. alkaloids and glucosides can be used. (Kokate, 2008) [2] Different plant varieties 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 above mentioned plants will add to the terrestrial biodiversity and the most effective medicinal plant used for nervous disorder can be obtained.

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