

Role of Medicinal Plants in Managing Neurodegenerative Diseases

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ABSTRACT

It is customary to use plants to treat human diseases. There has been a recent resurgence of interest. Field studies on ethnobotany have been conducted in a variety of developing nations worldwide. It shows worry over the potential loss of important knowledge regarding conventional medicine. Many times, neurological problems are not seen as common ailments. Like epilepsy, which is the most severe chronic ailment, they are mental illnesses. Millions of individuals are affected. Other diseases include Parkinson's, Alzheimer's, meningitis, and stroke. Speaking, breathing, movement, mood, and memory are all impacted by nervous system problems. A comprehensive treatment option is herbal medicine. Growing these significant herbs will increase the ecosystem's terrestrial variety and aid in biodiversity preservation. Some of the significant plants used in the treatment of nerve illnesses are Centella asiatica, Avena sativa, Lagenaria sicerana, Cassia tora, and Cassia fistula. A taxonomy categorization can be constructed based on medical applications and the relationships inferred between the many medicinal plant species' biochemical attributes and medicinal purposes. Studies in tissue culture and molecular characterization are also possible. The most potent medical plant used to treat mental disorders can be obtained, and significant medicinal plant gene flow will increase terrestrial biodiversity.

Keywords: Medicinal Plants, Mental Disorders, Ethnobotany.

INTRODUCTION

Most people rely on traditional medicine for their primary healthcare. However, neurological problems are frequently not regarded as common illnesses, and stigma and discrimination associated with health affect many people with mental illnesses like epilepsy badly. The most prevalent severe

chronic brain condition, epilepsy, is thought to impact at least 10 million people. Others include stroke, meningitis, Parkinson's, and Alzheimer's. Speaking, breathing, movement, mood, and memory are all impacted by nervous system problems. The brain and spinal cord are both affected by neurological diseases (Lal & Singh, 2009).

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The country's incredibly rich natural resources can be enhanced with the help of ethnomedicine and ethnopharmacology (Sushil, 1997). Given what is known about plants' therapeutic potential for treating neurologic illnesses, it is thought that study in the fields of ethnomedicine and ethnopharmacology is necessary. To aid those who suffer from nerve diseases, ethnomedicine and ethnopharmacology research can be used to study medicinal plants having qualities that can treat neurological disorders (Kashmira et al., 2010).

Tissues with medicinal significance affect the body physiologically. The plants contain alkaloids (in the forms of C, H, O, N), glucosides, essential oils, fatty oils, mucilages, tannins, and gums. Using plants to treat human illnesses has been a long-standing tradition (Soni, 1998). This research can assist in discovering the active substances in numerous plants as well as their modes of action. This may yield encouraging results. There has been a recent resurgence of interest. It shows worry over the potential loss of important knowledge regarding conventional medicine. Numerous studies have been done on medicinal herbs' neurological activities and modes of action. Studying medicinal herbs is crucial because most of the population relies on traditional medicine for their primary healthcare (Sushil, 1997).

The investigation will increase the likelihood of obtaining the composition for the treatment because the plants have the power to cure the condition.

Review of Medicinal Plants Used in the Treatment of Nervous Disorders

***Evolvulus alsinoides* L.:**

Two new compounds, 2,3,4-trihydroxy-3-methylbutyl 3-2 propionate and 1,3-di-O-caffeoyl quinic acid methyl ester, along with six known compounds—caffeic acid, 6-methoxy-7-O-beta-glucopyranoside coumarin, 2-C-methyl erythritol—guided the purification of the n-BuOH soluble fraction. While known compounds were confirmed by direct comparison of their NMR data with those reported in the literature, new compounds' structures were clarified via spectroscopic investigation. This is the first account of phenolic compounds being present in *Evolvulus alsinoides* (Nair, 1984). *Evolvulus* is a powerful nootropic drug that is mostly used to treat epilepsy, insomnia, and memory loss.

In adult male Sprague-Dawley rats, acute stress-induced biochemical alterations were used to test the separated compounds for anti-stress efficacy. Plasma levels of corticosterone, creatine kinase, glucose, and adrenal gland weight have all increased significantly as a result of stress exposure. The substances' ability to normalize hyperglycemia, plasma corticosterone, and adrenal hypertrophy showed them to have the most anti-stress effects. In East Asia, you can find it. The entire plant is employed as a medicine. Scopoletin, umbelliferone, and scopolin are the substances it contains. The compound has the chemical formula 2-methyl-1,2,3,4-butanetetrol. In general, all groups of rats and AD-induced rats showed positive stimulatory effects of *Evolvulus alsinoides* (EAE) extract on the cholinergic system [Truzano, 1998; Manikandaselvi, 2016; & Hyun, 2012). Figure no. 01 illustrated images of *Evolvulus alsinoides*



Figure – 01

***Avena sativa* L.:**

Avena sativa is mostly used to treat neurological and spasmodic illnesses that result in tiredness. Common symptoms of homeopathic *Avena sativa* include neurological debility, spermatorrhoea issues, and cardiac weakness. The homeopathic action of *Avena sativa* selectively affects the nervous system of the genitor-urinary apparatus in

male function neurasthenia. Using this remedy, it is simple to get rid of the nervous, heart palpitations, insomnia, nervous agitation, mental weakness or failure, and overall debility brought on by masturbation. In Europe, one can find it. The entire plant and seed are crucial. The chemical components are ascorbic acid, amino acids, and alkaloids (Jibril et al., 2023). Illustrated in Figure – 02.



Figure: 02

***Rauwolfia serpentine* L. (Benth) ex Kurz:**

In *Rauwolfia*, the root is used to treat mental illness and hypertension in people. Additionally, it is utilized to treat central nervous system disorders like anxiety and excitation (Jinna, 2013). It is used to treat aggression, mental illnesses, and insomnia. The central nervous system is calmed, and anxiety, impatience, and violence are

decreased. Schizophrenia, epilepsy, psychosis, and other mental illnesses can all be treated with it (Rajan, 2016). Both the Eastern and Western Ghats contain it. Desperpidine, indobine, reserpine, and serpentine are some of the significant chemicals found in the plant. The medicinal potential of *Rauwolfia serpentina* is enormous (Nair, 1984).

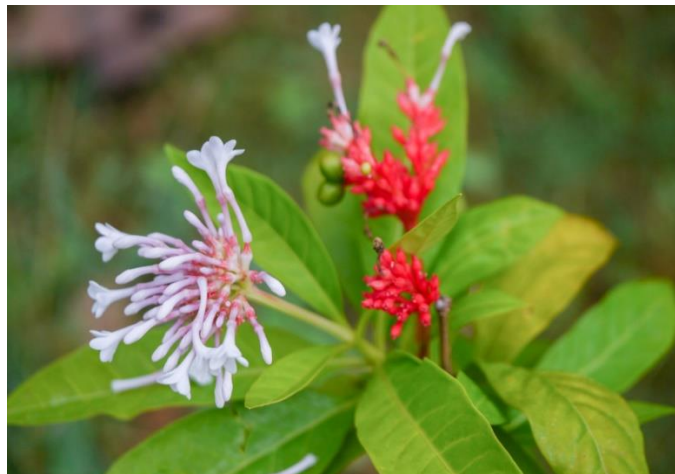


Figure no. 03

***Aegle marmelos* L:**

Various research in *Aegle marmelos* has proven in phytochemical screening that flavonoids, which are responsible for benzodiazepine's anxiolytic effects, are present. Therefore, the anti-anxiety function of *Aegle marmelos* may be due to its flavonoid content. Studies on *Aegle marmelos* have revealed the existence of other phytochemicals than flavonoids, including tannic acid, phenols, marmesinin, ascorbic acid, eugenol,

skimmianine, and saponin, among others, which may have calming effects. *Aegle marmelos* is a potentially effective and safe medication for treating a variety of anxiety disorders. Extracts of ethanol can be found in the fruit (Raheja, 2019). These are used to treat depression, anxiety, and exhaustion (Raheja, 2019). The fruit contains alkaloids, steroids, and coumarin. Fruits illustrated in figure 04 Sri Lanka is the nation where this factory is situated.



Figure – No: 04

***Rosmarinus officinalis* L.:**

In folk medicine, there are several therapeutic uses for this plant to treat or manage a variety of illnesses, including depression. The immediate treatment of mice with the extract decreased the immobility time swimming' test and tail suspension test in mice compared to a control, supporting the hypothesis that the *R. officinalis* extract generated an antidepressant-

like effect. The data that demonstrate the mechanism of action indicate that *R. officinalis*'s antidepressant effect is mediated by an interaction with the monoaminergic system and that this plant needs to be further studied as a potential alternative therapeutic strategy for the treatment of depression. (Nair, 1984). Figure 05 illustrated the plant *Rosmarinus officinalis*.



Figure No. 05

***Annona squamosa* L.:**

The ethanol extract of *Annona diversifolia* leaves has certain neuropharmacological effects. Intraperitoneal infusion of the extract prolonged the time in the rota-red and

swimming tests and postponed the onset of petylenetetrazole-induced clonic seizures. Additionally, the extract lengthened the amount of time spent sleeping after taking sodium pentobarbital (Rajan, 2016). These

findings suggest that the central nervous system is depressed by the ethanol extract of *A. diversifolia* leaves (Rajan, 2016). You can

find it in Cuba. Annonacin is the component that is active. Figure 06 illustrated the plant *Annona* with fruits.



Figure No. 06

***Bacopa monnieri* L:**

Numerous research has indicated that *Bacopa monnieri* L(Pennel) extracts may have protective benefits in animal models of neurodegeneration. The herbal supplement and extract have an impact on memory, anxiety, and brain health (Bhattacharya et al., 1982). Alzheimer's illness, nootropics, epilepsy, and memory enhancement are further uses for it (Singh & Dhawan, 1982). It aids in reducing anxiety and disorders associated with attention

deficit hyperactivity. In healthy older study participants, the whole plant standardized dry extract impacts safety and tolerability and has a role in cognitive function (Uabundit, 2010). The study offers more proof that it might be used to safely improve cognitive function in the elderly (Shinomol et al., 2011). The active constituents are triterpenoids, saponins, and bacosides. Figure No. 07 illustrated the image of the *Bacopa monnieri* plant.



Figure No. 07

***Ferula asafoetida* L.:**

Ferula asafoetida, commonly known as asafoetida or hing, is a plant native to Iran and Afghanistan. It has been used for centuries in traditional medicine for various health

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conditions, including neurological disorders. While its medicinal properties are not extensively studied, some research and anecdotal evidence is suggesting potential benefits for neurological disorders. However,

it's important to note that more robust scientific research is needed to establish its effectiveness and safety for specific conditions (Vijayalakshmi, 2012). Here are some potential medicinal roles of *Ferula asafoetida* with respect to neurological disorders:

Anticonvulsant properties: In animal studies, *Asafoetida* has shown anticonvulsant activity, indicating its potential usefulness in managing seizure disorders such as epilepsy. It may help reduce the frequency and severity of seizures, although further research is needed to validate these effects in humans.

Anti-inflammatory effects: Neurological disorders often involve brain or nervous system inflammation. *Asafoetida* possesses anti-inflammatory properties that may help reduce neuroinflammation and provide neuroprotective effects. This could potentially benefit conditions like multiple sclerosis, Alzheimer's disease, or Parkinson's disease, which involve inflammation in the central nervous system.

Sedative and anxiolytic effects: *Asafoetida* has traditionally been used as a

natural sedative and anxiolytic agent. It may help alleviate anxiety, stress, and sleep disorders. Promoting relaxation could indirectly support the management of neurological conditions characterized by these symptoms.

Migraine relief: Some studies suggest that *asafoetida* may benefit migraines, potentially due to its anti-inflammatory and analgesic properties. However, more research is needed to confirm these findings and determine the appropriate dosage and administration for migraine management.

It's important to consult with a healthcare professional or a qualified herbalist before using *asafoetida* or any other herbal remedy, especially for neurological disorders. They can provide personalized guidance based on your specific condition, medical history, and other factors. Additionally, it's crucial to note that *asafoetida* may interact with certain medications, so it's essential to inform your healthcare provider about any supplements or herbs you're considering. Figure 08 illustrates the image of *Ferula asafoetida*.



Figure No. 08

CONCLUSION

In conclusion, medicinal plants offer a vast array of potential uses for the treatment of nervous disorders. These natural remedies have been used for centuries in traditional medicine systems and continue to be a subject of scientific investigation. While more research is needed to fully understand their mechanisms of action, these plants show promising therapeutic properties such as

anticonvulsant, anti-inflammatory, anxiolytic, and neuroprotective effects. However, it is crucial to approach their use cautiously, seeking guidance from healthcare professionals or qualified herbalists to ensure safety, appropriate dosages, and potential drug interactions. With further exploration, medicinal plants have the potential to complement conventional treatments and provide valuable alternatives for managing

nervous disorders in a holistic and natural manner.

Declarations:

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Contribution by SRA: Designed the project, data collection, data analysis, and data interpretation. he did critical revision of the manuscript and final approval of the version.

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REFERENCES

- Bhattacharya, S. K. Bhattacharya, A., & Kumar, A. (2000). Antioxidant activity of *Bacopa monnieri* in rat frontal cortex, striatum, and hippocampus. *Phytother Res.*, 14(3), 174–179.
- Jinna, P., Yogesh, K., & Shankar, R. K. (2013). *Acorus calamus* Linn. A herbal tonic for the central nervous system. *J of Scientific and Innovative Research* 2(5), 950–954.
- Jibril, A. T., Arero, A. G., Kankam, S. B., & Fuseini (2023). M. Effect of *Avena sativa* (Oats) on cognitive function: A systematic review of randomized controlled trials. *Clinical Nutrition ESPN*. 53, 144-150.
- Kashmira, G., Patel, J. A., & Gajjar, A. K. (2010). Pharmacological review on *Centella Asiatica*: A potential herbal cure-all. *Indian J Pharma Sci* 72(5), 546–556.
- Singh, L. (2009). *Medicinal plants of India*. New Central Book Agency, India.
- Nair, S., Gupta, P. K., & Shirgurkar, M. V. (1984). In vitro organogenesis from leaf explants of *Annona squamosa* Linn. *Plant Cell Tiss Organ* Cult 3, 29–40. <https://doi.org/10.1007/BF00035918>
- Manikandaselvi, V. (2016). Uses of *Cassia occidentalis*. *Intl J Pharm sci res* 37(2), 41-46.
- Pulok, M., Venkatesan, K. N., Satheesh, K., & Heinrich, M. (2008). The ayurvedic medicine *Clitorea ternatea*: From traditional use to scientific assessment. *J of Ethnopharmacology* 120(3), 291-301.
- Rajan, S. (2016). Characteristics of medicinal amaltas or *Cassia fistula* plant.
- Raheja, S., Girdhar, A., Kamboj, A., Lather, V., & Pandita, D. (2019). *Aegle marmelos* leaf extract ameliorates the cognitive impairment and oxidative stress induced by intracerebroventricular streptozotocin in male rats. *Life Sci*. 15(221), 196-203. doi: 10.1016/j.lfs.2019.02.032. Epub Feb 14. PMID: 30771313.
- Sushil, K. S. (1997). Useful plants in diabetes. Orissa Environmental Society, India.
- Soni, P., Siddiqui, A. A., Dwivedi, J., & Soni, V. (2012). Pharmacological properties of *Datura stramonium* L. as a potential medicinal tree: an overview. *Asian Pac J Trop Biomed*. 2(12), 1002-8. doi: 10.1016/S2221-1691(13)60014-3. PMID: 23593583; PMCID: PMC3621465.
- Shinomol, G. K., Muralidhara, & Bharat, M. M. (2011). Exploring the role of 'Brahmi' (*Bacopa monnieri* and *Centella asiatica*) in brain function and therapy. *Recent Pat Endocr Metab Immune Drug Discov*. 5(1), 33–49.
- Singh, H. K., & Dhawan(1982). BN. Effect of *Bacopa monniera* Linn. (brahmi) extract on avoidance responses in rat. *J Ethnopharmacol*. 5(2), 205–214.
- Truzano, M. E. (1998). Extract of leaves of *Annona diversifolia* on the central nervous system in mice. John Wiley & Sons Ltd, USA.
- Uabundit, N., Wattanathorn, J., & Mucimapura, S. (2010). Cognitive

- enhancement and neuroprotective effects of *Bacopa monnieri* in Alzheimer's disease model. *J Ethnopharmacol.* 127(1), 26–31.
- Vijayalakshmi, Adiga, S., Bhat, P., Chaturvedi, A., Bairy, K. L., & Kamath, S. (2012). Evaluation of the effect of *Ferula asafoetida* Linn. gum extract on learning and memory in Wistar rats. *Indian J Pharmacol.* 44(1), 82-7. doi: 10.4103/0253-7613.91873. PMID: 22345876; PMCID: PMC3271546.
- Yadav, M. K., Singh, S. K., Singh, M., Mishra, S. S., Singh, A. K., Tripathi, J. S., & Tripathi, Y. B. (2019). Neuroprotective Activity of *Evolvulus alsinoides* & *Centella Asiatica* Ethanolic Extracts in Scopolamine-Induced Amnesia in Swiss Albino Mice. *Open Access Maced J Med Sci.* 127(7), 1059-1066. doi: 10.3889/oamjms.2019.247. PMID: 31049081; PMCID: PMC6490476.