



IN SEARCH OF NATURE'S PHARMACY: A DEEP DIVE INTO CONVULVULUS PLURICAULIS AND ITS MEDICINAL APPLICATIONS

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Abstract: A mainstay of many traditional medical systems, *Convolvulus pluricaulis* has been used historically to treat a wide range of illnesses.

Like morning glory, *C. pluricaulis* has medicinal qualities in all sections of its body and is used in traditional Chinese and Indian medicine to treat ailments like anxiety, hallucinations, epilepsy, and chronic cough. A thorough analysis of its phytochemistry, pharmacology, toxicity, and pharmacognosy demonstrates its wide range of applications and future research and development possibilities. Information gleaned from literature and computerized databases highlights its historical use in the treatment of viral and microbial infections, liver ailments, epilepsy, and disorders of the central nervous system. Its wide range of effects, which include antioxidant, neuroprotective, antistress, anxiolytic, tranquilizing, antidepressant, hypolipidemic, immunomodulatory, analgesic, antifungal, antibacterial, antidiabetic, antiulcer, antiscatonic, and cardiovascular effects, have been confirmed by pharmacological studies.

C. pluricaulis, also known as "Shankhpushpi" in Ayurvedic medicine, is highly prized for improving cognitive abilities, relieving neurological illnesses, and controlling hypertension. The species has been overfished due to its growing demand, which has resulted in the sale of unrelated plants as replacements.

Index Terms - *C. pluricaulis*

I. INTRODUCTION & BACKGROUND

For millennia, the use of traditional medical systems like Ayurveda, Siddha, and Unani has been essential to healthcare and remains valuable today. Although the usage of medicinal plants decreased with the introduction of synthetic pharmaceuticals and antibiotics, the negative effects and toxicity of synthetic medications have sparked a resurgence of interest in plant-based cures. Unfortunately, the resources of medicinal plants have been significantly damaged by overexploitation and overpopulation, especially in developing nations. This makes it more important than ever to characterize and conserve therapeutic plants.

Convolvulus pluricaulis Choisy is a prostrate spreading wild herb in the Convolvulaceae family. It can be found in the plains of Chota Nagpur, Punjab, Uttar Pradesh, Haryana, Rajasthan, and Bihar in India. It is advised as a brain tonic to improve intelligence and memory, get rid of nerve problems, and treat hypertension in Ayurveda. It is used to treat a variety of maladies. It is also well-known for its anthelmintic qualities, ability to treat skin conditions, cure diarrhea, act as a hair tonic, and lower blood pressure. In specifically, the leaves are suggested for the treatment of depression and mental health issues. The herb is used to treat nerve ailments. The plant contains alkaloids, glycosides, coumarins, and flavonoids.

Due to its natural origins and lower side effects, herbal medicine has experienced exponential increase in popularity in recent years, both in developing and developed nations. The diversity of plants provided early people with a range of necessities, including medicine to treat a wide range of illnesses. According to the Indian Ayurvedic pharmacopeia, Shankhpushpi comprises the entire plant of *Convolvulus microphyllus* Sieb. ex Spreng and *Convolvulus pluricaulis* Choisy. However, in many parts of India, plants other than *C. pluricaulis*—such as *Evolvulus alsinoides*, *Clitoria ternatea*, and *Canscora decussata*—are frequently sold under the same name.

In recognition of the *C. pluricaulis* drug's potential to treat a wide range of conditions, including central nervous system depression, anxiolytic, tranquilizing, antidepressant, antistress, neurodegenerative, anti-amnesic, antioxidant, hypolipidemic, immunomodulatory, analgesic, antifungal, antibacterial, antidiabetic, anti-ulcer, anticholinergic, and cardiovascular activities, the Indian Council of Medical Research has established quality standards for the drug. Alkaloids, flavonoids, and coumarins are thought to be responsible for these pharmacological advantages.

It has been shown that *C. pluricaulis* is effective in lowering traumatic, chemical, and psychological stress. Studies on female mice have demonstrated that the root extract can control hyperthyroidism, and the fresh plant's juice has anti-ulcerogenic properties similar to those of sucralfate.

Chemical composition of *Convolvulus Pluricaulis*:

In a study for the antioxidant potential and neuroprotective activity of *convolvulus pluricaulis*, researchers used gas chromatography-mass spectrometry on the *convolvulus pluricaulis* plant and identified the volatile compounds, alcohols, branched hydrocarbons, esters, and another group of compounds.

Table 1. GC-MS analysis of phytochemical constituents of *Convolvulus pluricaulis* 70% ethanolic extract.

S.No	compound	RT	Molecular weight	Molecular formula
1	2-Butanone	4.958	72.10572	C ₄ H ₈ O
2	Pentanoic acid	6.457	102.1317	C ₅ H ₁₀ O ₂
3	Cinnamic acid	6.836	148.1586	C ₉ H ₈ O ₂
4	Silane	6.928	32.117	H ₄ Si
5	Decanoic acid	6.985	172.26	C ₁₀ H ₂₀ O ₂
6	2-Pentanol	8.191	88.148	C ₅ H ₁₂ O
7	Ascorbic acid	8.209	176.12	C ₆ H ₈ O ₆
8	10-Bromodecanoic acid	8.341	251.16	C ₁₀ H ₁₉ BrO ₂
9	tridecane	8.774	184.36	C ₁₃ H ₂₈
10	Phthalic acid	9.204	166.14	C ₆ H ₄ (COOH) ₂
11	eicosane	10.56	282.5475	C ₂₀ H ₄₂
12	Octatriacontyl pentafluoropropyl	10.56	697.0409	C ₄₁ H ₇₇ F ₅ O ₂

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13	1-Octadecanesulphonyl chloride	11.65	353.003	C ₁₈ H ₃₇ ClO ₂ S
14	Squalene	11.79	410.718	C ₃₀ H ₅₀
15	pyrimidine	11.87	80.088	C ₄ H ₄ N ₂
16	Heneicosane	12.23	296.5741	C ₂₁ H ₄₄
17	1,2-Benzenedicarboxylic acid	12.6	166.1308	C ₈ H ₆ O ₄
18	Cyclononasiloxane, octadecamethyl	12.67	667.3855	C ₁₈ H ₅₄ O ₉ Si ₉
19	Nonacosane	12.82	408.6	C ₂₉ H ₆₀
20	Sulfurous acid pentadecyl propyl ester	12.93	334.5575	C ₁₈ H ₃₈ O ₃ S
21	Vitamin E	13.01	430.7061	C ₂₉ H ₅₀ O ₂
22	Cyclononasiloxane	13.89	370.7697	C ₁₀ H ₃₀ O ₅ Si ₅

Neuroprotective property of *Convolvulus pluricaulis*:

Numerous studies have investigated the neuroprotective properties of *Convolvulus pluricaulis*, attributed to its nootropic effects on brain function. Additionally, it holds a prominent place in Ayurvedic medicine for its brain enhancing properties.

In male Wistar rats, scopolamine-induced neurotoxicity was studied in order to determine the neuroprotective qualities of *Convolvulus pluricaulis* aqueous extract (AE). The Elevated Plus Maze (EPM) and Morris Water Maze (MWM) are two behavioral tests used in research to assess cognitive processes. In addition, the study evaluated how AE affected in vivo antioxidant activities and neurochemical enzymes, contrasting these results with those of rivastigmine tartrate, a well-known cholinesterase inhibitor. The cerebral cortex and hippocampus, two important areas for memory and learning, both had substantial acetylcholinesterase (AChE) activity inhibition when exposed to AE, according to biochemical tests. Previous research has shown that it can improve memory and cognitive processes by lowering oxidative stress indicators like protein carbonyl and malondialdehyde (MDA) and raising protein synthesis in the hippocampus.

In the context of Alzheimer's disease (AD), where oxidative stress and cholinergic impairments are prevalent, *C. pluricaulis*'s neuroprotective properties are especially noteworthy. The results of the study provide credence to the theory that two important tactics for preventing cognitive decline are increasing cholinergic neurotransmission and decreasing oxidative damage. Scopolamine replicates some of the characteristics of AD by inducing cognitive deficits in animal models; this serves as a foundation for assessing AE and other possible treatment medicines. The neuroprotective benefits of AE were further supported by histopathological investigations, which revealed that treated rats' cerebral cortex underwent less structural change. These findings demonstrate the ability of AE to protect neurons from neurotoxicity while maintaining their integrity and functionality.

Antihyperlipidemic activity of *Convolvulus pluricaulis*:

In rats fed a high-fat diet (HFD) and low doses of streptozotocin (STZ), a recent study examined the effects of *Convolvulus pluricaulis* (CPME) methanolic extract on lipid and glucose levels. Prior studies have demonstrated the potential of CPME in models of transitory hyperlipidemia; however, its effectiveness in chronic situations has not been investigated. This study used a diet that resembled typical Indian cuisine to validate CPME's ability to decrease cholesterol and evaluate its potential for hypoglycemia.

The outcomes showed that the HFD-STZ model's lipid profiles were considerably improved by CPME. Notably, CPME increased high-density lipoprotein cholesterol (HDL-c) while decreasing serum triglycerides (TG), total cholesterol (TC), and low-density lipoprotein cholesterol (LDL-c).

Histopathological examination showed that the untreated diabetic group's pancreatic islets were much smaller and fewer in number than those of the controls. The group treated with GPZ had almost normal islet morphology, but the group treated with CPME resembled the diabetic group that was not treated, indicating that CPME has a limited effect on islet preservation. Overall, this study shown that whereas CPME significantly lowers blood cholesterol, it has no effect on hyperglycemia in diabetic rats. These results imply that although CPME might be helpful in controlling dyslipidemia, it might not provide a thorough cure for glucose dysregulation associated with diabetes. In order to treat both lipid and glucose problems, future research should examine the possible synergistic effects of combining CPME with additional antidiabetic medications.

The therapeutic potential of traditional herbal remedies has to be further investigated, especially in the management of complicated metabolic illnesses, as this study makes clear. This research is relevant to dietary implications on metabolic health since typical food items were used for the model induction. The results of this study may open the door to safer substitutes for traditional hypolipidemic medications, which might provide a more comprehensive strategy for controlling the cardiovascular risks linked to diabetes.

***Convolvulus pluricaulis* (Shankpushpi) and its potential as an Anti-Addictive Agent Against Alcohol Dependency:**

Globally, alcohol addiction is a complicated issue with significant public health ramifications. A thorough grasp of the underlying neurobiological mechanisms and the investigation of innovative treatment strategies are necessary to address this complex issue. A plant with a long history in traditional medicine for its supposed neurological advantages, sankhpushpi (*Convolvulus pluricaulis*), shows promise as a treatment for alcoholism. In order to explore Shankpushpi churna's potential as an anti-addictive drug, researchers examined the effects of the plant on mice's chronic alcohol intake and ethanol withdrawal anxiety.

In order to assess Shankpushpi's effect on ethanol withdrawal anxiety using the elevated plus maze paradigm, the inquiry started with a thorough screening procedure. After acutely administering Shankpushpi churna, researchers saw a significant dose-dependent decrease in anxiety associated with withdrawal. This finding set the stage for more research by offering preliminary information on the herb's anxiolytic qualities.

Building on these initial results, scientists examined the long-term impacts of Shankpushpi churna on mouse habits of alcohol intake. They used the two-bottle choice paradigm, a well-researched model that closely resembles voluntary alcohol consumption in humans, to carefully observe the animals' drinking patterns over a lengthy period of time. Surprisingly, administering Shankpushpi led to notable decreases in long-term ethanol intake, which were matched by an increase in water intake. This crucial finding highlights Shankpushpi's capacity to influence addictive behaviors and provides promise in the search for strong anti-addictive therapies.

Crucially, pharmacological antagonists were used by researchers to specifically disrupt GABA receptor activity in order to identify the function of GABA receptors in modulating Shankpushpi's action. Remarkably, Shankpushpi's anti-addictive effects reverse following GABA receptor blocking, highlighting the critical role GABAergic neurotransmission plays in its mode of action. This mechanistic clarification highlights the significance of GABAergic regulation in addiction treatment paradigms and advances our knowledge of Shankpushpi's pharmacodynamics.

To sum up, this study reveals that Shankpushpi churna has promising anti-addictive potential in helping to mitigate alcohol reliance in mice. Through GABA receptor-mediated pathways, Shankpushpi reduces chronic alcohol intake and lessens the anxiety associated with ethanol withdrawal, making it a promising

candidate for more investigation in the field of addiction studies. These results underline the need of translational research in treating complicated neurological illnesses in addition to highlighting the therapeutic potential of conventional herbal treatments.

Exploring the Antidepressant Potential of *Convolvulus pluricaulis*:

A study examined the effects of various fractions of *Convolvulus pluricaulis* Choisy's total ethanolic extract on mice's depression. Specifically, over the course of 10 consecutive days, distinct groups of male Swiss albino mice were given oral doses of the petroleum ether, chloroform, and ethyl acetate fractions. The tail suspension test (TST) and the forced swim test (FST) were used to assess the effects. Furthermore, by contrasting the extracts' effects with those of common antidepressants like imipramine and fluoxetine, the study looked at how these extracts interacted with different neurotransmitter systems linked to depression. A research looked at the impact of different fractions of the total ethanolic extract of *Convolvulus pluricaulis* Choisy on depression in mice. Specifically, oral dosages of the petroleum ether, chloroform, and ethyl acetate fractions were administered to different groups of male Swiss albino mice for ten consecutive days. The effects were evaluated using the forced swim test (FST) and the tail suspension test (TST). The study also examined the interactions between the extracts and several neurotransmitter systems associated with depression by comparing the extracts' effects with those of popular antidepressants such as imipramine and fluoxetine.

***Convolvulus pluricaulis* along with CNS depressant and anti-anxiety activities**

An investigation of the neuroprotective qualities of *Convolvulus pluricaulis*, a plant that has long been utilised in Ayurvedic medicine to improve mental health and reduce stress, was carried out. *Convolvulus pluricaulis*, a brain tonic, is well-known for its potential to improve memory, have psychostimulant effects, and ease mental strain.

The protective effects of a hydroalcoholic extract from *Convolvulus pluricaulis* leaves were the main focus of this study, with specific attention paid to the extract's possible CNS depressive and anti-anxiety properties in mouse models. Using a Soxhlet device, the leaves were processed by mixing water and alcohol to create the extract. In accordance with OECD guideline 423, acute toxicity was evaluated in 18 male albino mice that were given doses ranging from 1 to 2000 mg/kg and were observed for 14 days.

The mice were given dosages of 100, 200, and 300 mg/kg of the extract for the assessment of their psychomotor activity. The actophotometer, open field, rota-rod, grip strength tests, raised plus maze, hole board test, inclined plane, and chimney test were among the behavioural and motor function tests performed to evaluate the extract's effects.

The extract was shown to fall into category 4 of the acute toxicity study, which validated the doses that were chosen for additional testing. At these dosages, there were notable CNS depressive and anti-anxiety effects in the psychomotor tests. The extract may have the ability to influence anxiety and CNS activity because mice showed decreased activity levels and an increase in anxiety-related behaviours.

To sum up, in mice models, the hydroalcoholic extract of *Convolvulus pluricaulis* leaves at doses of 100, 200, and 300 mg/kg showed significant CNS depressive and anti-anxiety effects. These results provide scientific credence to the traditional Ayurvedic use of *Convolvulus pluricaulis* as a stress reliever and cognitive enhancer, as well as its neuroprotective and anxiolytic properties.

Conclusions and future perspective:

In conclusion, *Convolvulus pluricaulis*, a cornerstone of traditional medicine across various cultures, stands as a testament to the enduring power of natural remedies in addressing human ailments. With a rich history steeped in the annals of Ayurveda and other traditional healing systems, this herb has garnered widespread recognition for its multifaceted therapeutic properties. From alleviating anxiety and depression to combating microbial infections and neurological disorders, *Convolvulus pluricaulis* has demonstrated remarkable versatility in addressing a myriad of health concerns.

The comprehensive analysis of its phytochemistry, pharmacology, and toxicity underscores the depth of its medicinal potential, offering a promising avenue for future research and development. Moreover, the herb's reputation as a cognitive enhancer and hypertension controller further underscores its significance in contemporary healthcare practices. However, the increasing demand for *Convolvulus pluricaulis* has led to concerns regarding overfishing and the proliferation of counterfeit products, necessitating stringent conservation efforts and quality control measures.

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