



ORIGINAL RESEARCH PAPER

Chemistry

A REVIEW ON PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL ACTIVITIES OF CONVULVULUS PLURICAULIS PLANT.

KEY WORDS: *Convolvulus pluricaulis*, Memory Enhancer, Indigenous Plant, Anti-Ulcer Effects.

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ABSTRACT

Convolvulus pluricaulis an indigenous plant commonly mentioned in Ayurveda, as a rasayana which is mainly advocated for use in mental stimulation and rejuvenation therapy. *Convolvulus pluricaulis* is a prostrate, spreading, perennial, wild herb commonly found on sandy or rocky ground under xerophytic conditions in northern India. The drug is used as antiepileptic. It is used alone or is administered along with modern antiepileptic drugs. Little human research has been published in the Western medical literature regarding this plant. One study shows *Convolvulus pluricaulis* to have anti-ulcer effects due to augmentation of mucosal defensive factors like mucin secretion and glycoproteins. Another study showed that *Convolvulus pluricaulis* may be helpful in improving symptoms of hyperthyroidism by reducing the activity of a liver enzyme. *Convolvulus pluricaulis* used as a brain tonic. Is used as a tonic, alterative and febrifuge. It is a sovereign remedy in bowel complaints especially dysentery. The plant is reported to be a prominent memory improving drug. It is used as a psycho stimulant and tranquilizer. It is reported to reduce mental tension.

INTRODUCTION.

Herbal medicine is making a spectacular comeback since the side effects of synthetic medicine are daunting, and therapeutic approach is drifting towards alternative medicine. In both organised (Ayurveda, Unani) and unorganised (folk, tribal, native) forms, plants are utilised as therapeutic agents. *Shankhapushpi* (*Convolvulus pluricaulis* Choisy, CP) is one such effective herb and has been used since ancient times by physicians and laymen to combat diabetes. The herb appears to produce its action by modulation of neuro-chemistry of the brain. Further, the herb is non-toxic and its use does not produce any side effects. On the other hand, there is invigorating effect in improvement of health and weight gain. The whole herb is used as an alternative, tonic, and febrifuge. Various dosage forms and a wide array of derived products (active, natural principles and crude extracts) have been used in the traditional system of medicine and have reported therapeutic activity experimentally and clinically in numerous scientific journals. *Shankhapushpi*, with flowers shaped like a *Shankha* (conch), is one of Lord Shiva's sacred instruments often used in ritual worship. It is considered *Medhya Rasayana* (memory enhancer) in *Ayurvedic*, and has been used as rejuvenator, anti-ageing,. One study has shown that *shankhapushpi* includes anti-ulcer effects because of growth of mucosal defensive factors such as glycoproteins and mucin secretion. As per another study, may be helpful to treat the symptoms of the hyperthyroidism by decreasing the liver enzyme activity.^(1,2,3)



Fig No.1 *Convolvulus pluricaulis*

PLANT PROFILE

Convolvulus pluricaulis.

Scientific classification:

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Solanales

Family: Gentianaceae

Genus: *Convolvulus*

Species: *pluricaulis*

Common Name: Shankhapushpi

Vernacular names: The Vernacular names of *C. pluricaulis* described as follows:

Sanskrit: Sankhapuspa

Bengal: Sankhapuspi

Gujarathi: Shankhawali

Hindi: Shankhapushpi, Aparajit

Kannada: Bilikanthisoppu

Marathi: Shankhavela

Punjabi: Shankhapuspi

Tamil: Sanghupushpam, kakkurattai

Telugu: Shankhapushpi

Uses: Primarily, Shankhapushpi is used as a brain tonic. It is one of the best and prominent natural medicines that help in improving memory. The whole plant of shankhapushpi is used in medical treatment. Its consumption also prevents memory loss. The herb is also used as one of the most important ingredients in the treatment of disorders/syndromes, such as hypertension, hypotension, anxiety neurosis, stresses etc.⁽⁴⁾

Habit and Habitat:

Plant of Shankhapushpi is found everywhere in India in sandy and stony areas and prefers dry climate. The plant can be found in variety of places including sandy and rocky surfaces particularly in North India. This plant belongs to Convolvulaceae family and usually flowers during September and October. The flowers can range between white to light pink in colour.

Botanical Description:

Convolvulus pluricaulis a perennial herb that seems like morning glory. Its branches are spread on the ground and can be more than 30 cm long. The flowers are blue in colour (5 mm) and the leaves, which are elliptic in shape (2 mm), are located at alternate positions with branches or flowers. Known as Aloe weed in English, the herb is commonly found in India, especially in the state of Bihar. All the parts of the herb are known to possess therapeutic benefits. It is believed to be the only herb that is capable of enhancing all the aspects related to brain power, such as learning, memory and the ability to recall. However, its popularity stems from its ability to treat insomnia effectively. Chemical studies of whole plant have

shown the presence of glycosides, coumarins, flavonoids and alkaloids. Shankpushpi, (the alkaloid) has been identified as active principle. B. sitosterol glycosides, Hydroxycinnamic acid, Octacosanol, tetracosane along with glucose, sucrose also have been isolated from the plant drugs.⁽⁵⁾ In India it is extensively distributed in and grows on the waste land in the plains of, Bihar Chhotanagpur and Punjab. It mostly grows on sandy or rocky ground under xerophytic conditions in northern India. *Convolvulus* is known from the margins and within the Sahara and Sind deserts, a distribution that called SaharoSindian.⁽⁶⁾ The herb produces flowers during the months of September and October which can range from white to light pink in colour.⁽⁷⁾

Phytochemical constituents:

Table 1: Phytochemical features

Sr.No	Phytochemicals	<i>Convolvulus pluricaulis</i>
1.	Alkaloids	Only convolamine has been identified but other alkaloids (convoline, convolidine, convolvine, confoline, convosine, etc.) were found in other species of this family. The plant contains alkaloid shankpushpine (C ₁₇ H ₂₅ NO ₂), melting point from 162°C to 164°C ^(8,9,15)
2	Carbohydrates	D-glucose, maltose, rhamnose, sucrose, starch and other carbohydrates ^(15,16)
3	Proteins and amino acids	Proteins and amino acids ^(17,18)
	Fatty acids/volatile oil/Fixed oil	Volatile oil, fatty acids, fatty alcohols; hydrocarbons, myristic acid (30.9%), palmitic acid (66.8%) and linoleic acid (2.3%) and straight chain hydrocarbon, hexatriacontane. ⁽¹⁹⁾
4	Phenolics/Glycosides / Triterpenoid/Steroids	Scopoletin, -sitosterol and ceryl alcohol. Chloroform fraction of this contains 20-oxodotriacontanol, tetratriacontanoic acid and oxodotriacontanol, flavonoid, k ampferol, steroids, phytosterols, - sitosterol. ^(20,21)

Pharmacological activity

Convolvulus pluricaulis has been extensively studied for its diverse pharmacological activities which are as follows:

Antidepressant activity

Characteristically, Shankpushpi was one of the few drugs that were used an antidepressant and to put the brain in a stress-free state. Studies on animals with induced stress showed that Shankpushpi has depression and stress reducing properties. Further research into the process of stress reduction has yet not been concluded⁽²³⁾.

Antidiabetic activity

Convolvulus pluricaulis Choisy was found to be effective medicine for treatment of diabetes⁽²⁴⁾.

Effect on learning and memory

An improvement in memory after administering with Shankpushpi extracts was clearly identified in Simple memory tests such as pole-climbing apparatus, passive avoidance paradigm and active avoidance paradigm tests. The ethanolic extract of CP and its ethyl acetate and aqueous fractions were evaluated for their memory enhancing properties. Two doses (100 and 200 mg/kg/p.o.) of ethyl

acetate and aqueous fractions of the ethanolic extract were administered in separate groups of animals. Both the doses of all the extracts of CP significantly improved memory and learning in rats⁽²³⁾.

Antimicrobial, insecticidal, antifungal, antibacterial and antihelmintic activity

The entire plant was bioassayed by the leaf disc method by feeding deterrence using *Spilosoma oblique* walker as a test insect. A novel compound, 29-oxodotriacontanol isolated from the chloroform fraction of this plant was shown to be a potent antifeedant constituent under laboratory evaluations, whereas another compound, tetratriacontanoic acid was found for the first time in this plant. The azadirachtin and crude neem extracts were taken as standard. A new compound (29-oxodotriacontanol) produced 85.74% inhibition at 8000 ppm concentration⁽²⁵⁾. The alcoholic extract of *Convolvulus pluricaulis* contained potent antifungal activity⁽²⁶⁾.

Anticonvulsant activity

The water soluble portion of an alcoholic extract abolished spontaneous motor activity and the fighting reaction, but did not affect the escape response; electrically induced convulsive seizures and tremorine induced tremors were antagonised by the extract⁽²⁷⁾. It was observed that the animals treated with the methanolic extracts of stem callus, leaf callus and entire plant (200 mg/ kg oral) showed noteworthy protection against tonic convulsion induced by transcorneal electroshock, which was also similar with that of the standard drug phenytoin⁽²⁸⁾. It has also been shown to possess a potent anticonvulsant activity⁽²⁹⁾.

Antilulcer and antitonic activity

The antilulcerogenic effect of this plant was found to be due to increase of mucosal defensive factors such as glycoprotein, lifespan of mucosal cells and mucin secretion rather than on the offensive factors such as acid pepsin⁽³⁰⁾.

Effect on thyroid gland

The root extract of *Convolvulus pluricaulis* Choisy. (0.4 mg / kg.d) for 30 days administered to L-thyroxine induced hyperthyroid mice decreased serum concentration of T3 and hepatic 5-D activity. These results point out that the plant extract-induced inhibition in thyroid function is primarily mediated through T4 to T3 conversion^(24,31).

Cardiovascular activity

A total water soluble fraction of the plant caused a marked and prolonged hypotension in dogs and inhibited the frog myocardium^(32, 33). An ethanolic extract of the entire plant exerted a negative inotropic action on amphibian and mammalian myocardium. It also exerted spasmolytic activity on smooth muscles⁽²⁷⁾.

Anxiolytic activity

Ethyl acetate and aqueous fractions of the ethanolic extract of aerial parts of *Convolvulus pluricaulis* Choisy displayed significant anxiolytic effect. Petals showed an anxiolytic effect as proved by an increase in the time spent in open arms⁽³⁴⁾. The ethyl acetate fractions reduced the neuromuscular coordination indicative of the muscle relaxant activity at a higher dose.

Antioxidant activity

The methanolic extract of whole plant on *Convolvulus pluricaulis* Choisy. exhibited considerable antioxidant activity⁽³⁵⁾. Another study with ethanolic extract of *Convolvulus pluricaulis* Choisy. When tested *in vitro* showed antioxidant activity⁽³⁶⁾.

Neuroprotective activity

Aqueous extract of *Convolvulus pluricaulis* Choisy exhibited potent neuroprotective activity through anti AChE and antioxidant activity⁽³⁷⁾.

Hypolipidemic

An ethanolic extract of the whole plant when introduced to cholesterol fed gerbils, reduced serum cholesterol, LDL cholesterol, triglycerides and phospholipids significantly after 90 days⁽³³⁾.

Effect on reproductive system and immunomodulation

The juice of the whole plant prevents excessive menstruation. The fine paste made by grinding the plant is helpful for the cure of abscesses⁽³⁸⁾.

Uses of *Convolvulus pluricaulis*⁽²²⁾

1. The *Convolvulus pluricaulis* plant extract is well known for treating insanity and hematemesis.
2. Leaves of *Convolvulus pluricaulis* plant are used to treat bronchitis and asthma.
3. The plant root is herbal remedy to treat childhood fever.
4. *Convolvulus pluricaulis* plant extract avoids fluid retention in the body and supports digestion.
5. The ethanolic extract of *Convolvulus pluricaulis* herb reduces the levels of (NEFA) non esterified fatty-acid which is main cause of death due to cardiac arrest.
6. In Ayurveda *Convolvulus pluricaulis* plant is also used for treatment of epilepsy.

CONCLUSION

The present study on pharmacognostic standardisation, physicochemical evaluation of *Convolvulus pluricaulis* leaf can be used as standard in regard to its identification parameters and quality control assuming significantly in the way of acceptability of medicinal plant in present scenario. The herb induces a feeling of calm and peace, good sleep and a relief in anxiety, stresses, and mental fatigue, producing a significant reduction in the level of anxiety, neuroticism arising due to various levels of stresses. The herb appears to produce its action by modulation of neuro-chemistry of the brain. Further, the herb is non-toxic and its use does not produce any side effects. On the other hand, there is invigorating effect in improvement of health and weight gain.

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