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Ethnobotany, Phytochemistry and Pharmacology of *Convolvulus pluricaulis*, choisy.

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ABSTRACT

Shankhpushpi (*Convolvulus Pluricaulis* – Family Convolvulaceae) is an indigenous and very significant herb in Ayurveda. Many current Ayurvedic practitioners and authors believe that Shankhpushpi is a gift of nature. The Ayurvedic herb Shankhpushpi is one of the best and well-known natural medicine which helps in enhancing memory. From ancient times in India, people of all age groups (especially students, teachers and philosophers) always have tried Shankhpushpi. The herb has been used in Ayurveda for rejuvenating nervous functions. According to Ayurveda, Shankhpushpi is pungent, alternative tonic, bitter, brightens intellect, improves complexion, increases appetite, useful in bronchitis, biliousness, epilepsy and teething troubles of infants etc. It is also a natural tonic for mental development of children. This Review particularly deals with the Ayurvedic importance along with the pharmacological aspects of *Convolvulus Pluricaulis* Choisy.

Keywords: Shankhpushpi, Nervous functions, complexion, epilepsy

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INTRODUCTION

Convolvulus Pluricaulis Choisy. also known as Shankpushpi belongs to family convolvulaceae and is found in most of the regions. It is a perennial herb with prostrate branches and small elliptic to oblong, lanceolate, obtuse, mucronate leaves. It has light blue flowers mostly solitary in upper axils or sometimes in pairs, axillary joined at the middle near the peduncle where two small opposite lanceolate bracteoles are present, styles two distinct from the base each divides again once thus, producing four stylar branches. The most likely appearance of the flower is like a “Shankh” (a marine shell) which is why the name given to this plant is Shankpushpi (Pushpa meaning flower) [1-3]. It is a small, hairy, procumbent, diffuse herb and is often considered as morning glory [4]. Steam distillation of the fresh plants gives pale yellow oil with a green tinge and a characteristic odour [2].

In India it is extensively distributed in and grows on the waste land in the plains of, Bihar Chhotanagpur and Punjab [5, 6]. 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 Saharo Sindian [7]. The herb produces flowers during the months of September and October which can range from white to light pink in colour [8].

Shankpushpi is considered as one the very important herbs in Ayurveda. It is regarded as alexiteric and tonic to improve memory and to tone brain [9]. The leaves of Shankpushpi were traditionally used to treat chronic bronchitis and asthma; roots are used to cure childhood fever and oil extracted from plant stimulates the growth of hair [10]. It is also one of the best herbs that are used for enhancing beauty and helps in nourishing all the layers of skin. Not much research has been published in the western medical literature on Shankpushpi. There is one study on the herb, which throws light on its anti-ulcer properties and its helpfulness in alleviating the symptoms of hyperthyroidism, by reducing the activeness of a liver enzyme b [6].

Table 1: Bio-energetics of *Convolvulus Pluricaulis* Choisy.

Rasa	Katu, Kashaya
Guna	Guru, Sara, Snigdha, Pichchila
Virya	Ushna
Vipaka	Madhura
Dosha	Balances and alleviates all the three doshas viz Vata, Kapha and Pitta
Karma	Medhakrita, Svarakara, Grahabhutadi doshaghna, vashikaranasiddhida

Table 2: Vernacular Names of *Convolvulus Pluricaulis* Choisy.

Hindi	Torki
Bengali	Bhangra
Gujarati	Jhinkigali
Marathi	Bhangra
Urdu	Sankhauli
Punjabi	Kodio

Table 3: Taxonomic Position: of *Convolvulus*

Kingdom	Plantae
Sub kingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Sub class	Asteridae
Order	Solanales
Family	Convolvulaceae
Genus	<i>Convolvulus</i>
Species	<i>pluricaulis</i>

Ethnobotanical Uses

The Advancement of Ethnobotanical Research in the past few years has been on a rise and more specifically on plants that have socioeconomic and socio religious aspects in human life. Herbs have been used for centuries in India for treatment of many disorders like anxiety, insomnia and to promote longevity and prevent diseases by providing strength and immunity [11, 12].

Chronic Bronchitis and Asthma are treated using the leaves of *Convolvulus pluricaulis*. Apart from the leaves the roots and oil extracted from the plant are have proven to be quite useful as a remedy for childhood fever and stimulation of growth of hair respectively [10]. The whole herb in the form of a decoction with cumin and milk aids in treating nervous debility, loss of memory, syphilis fever, and scrofula. Shankpushpi is a hot aphrodisiac, astringent and a nervine tonic [13]. It improves strength, digestive power, complexion and voice and cures intestinal worms, dysuria, animal poisoning, dyspnea, cough, diabetes, and uterine disorder [10]. It is helpful in epilepsy, insomnia, heart disease and hemetemesis [14]. In southern India, the whole plant is used in various formulae as a nervine tonic for improvement of intellect and memory. The leaves and flowers possess hypotensive properties used for treating anxiety neurosis [15].

It is suggested as a brain tonic to promote intellect and memory, eradicate nervous disorders and to take care of hypertension [9, 16]. The tribals in Chindwara, Madhya Pradesh, India describe it as an antihelmintic, good in dysentery, and a one herb which cures skin ailments and reduces high blood pressure [10]. In Gonda Uttar Pradesh, India, the leaves are recommended for mental disturbance and depression [17].

It is used as a tranquilizer and psycho stimulant. It is reported to decrease mental strain. Additionally, the herb is non-toxic and its use does not bring into being any side effects. On the other hand, there is stimulating effect in strengthening of health and weight gain [19]. According to Ayurvedic concept, Rasayana therapy simultaneously affects the body and mind and brings about psychic and physical improvement. This therapy prevents the effects ageing, develops intelligence and augments the body resistance against diseases [15].

It is one of the most important Medha Rasayana drugs in Ayurveda. Its use improves the balance and vitiation in Kapha-vata-pitta doshas and the herb is astringent and bitter [20]. Herbalists believe that Shankhpushpi calms the nerves by regulating the body's production of the stress hormones, cortisol and adrenaline [19].

Phytoconstituents

The chemical constituents in Shankhpushpi consist of carbohydrate-D-glucose, rhamnose, maltose, sucrose and starch. It also contains proteins, amino acids and the alkaloids-convolvine, convolamine, confoline, phyllabine, convolidine, convoline, convosine, subhirsine and convolidine along with fatty acid and wax constituents, hydrocarbons, aliphatic and sterol. and certain other bio-chemicals which include scopoletin, glacial acetic acid, three coumarins, β -sitosterol, kaempferol, tropane alkaloids, linoleic acid, palmitic acid and straight chain hydrocarbon hextriacontane, 20-oxodotriacontanol, tetratriacontanoic acid and 29-oxodotriacontanol. Alcoholic extract of plant yield Di-oh-cinnamic acid, kaempferol and Betastosterolglucos steroid of microphyllic acid. Hydroxy Cinnamic acid, Octacosanol tetracosane along with glucose, sucrose also have been isolated from the plant [21-23].

Pharmacological Activities

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

Antidepressant activity

Characteristically, Shankhpushpi 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 Shankhpushpi has depression and stress reducing properties. Further research into the process of stress reduction has yet not been concluded [24].

Antidiabetic activity

Convolvulus pluricaulis Choisy was found to be effective medicine for treatment of diabetes [22].

Effect on learning and memory

An improvement in memory after administering with Shankhpushpi 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 [24, 25].

Antimicrobial, insecticidal, antifungal, antibacterial and antihelminthic 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 [26]. The alcoholic extract of *Convolvulus pluricaulis* contained potent antifungal activity [27].

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 [28]. 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 [29]. It has also been shown to possess a potent anticonvulsant activity [30].

Antiulcer and anticatatononic activity

The antiulcerogenic 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 [31].

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 [22, 32].

Cardiovascular activity

A total water soluble fraction of the plant caused a marked and prolonged hypotension in dogs and inhibited the frog myocardium [33, 34]. 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 [28].

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 [35]. The ethyl acetate fractions reduced the neuromuscular coordination indicative of the muscle relaxant activity at a higher dose [25].

Antioxidant activity

The methanolic extract of whole plant on *Convolvulus pluricaulis* Choisy. exhibited considerable antioxidant activity [36]. Another study with ethanolic extract of *Convolvulus pluricaulis* Choisy. when tested *in vitro* showed antioxidant activity [22, 37].

Neuroprotective activity

Aqueous extract of *Convolvulus pluricaulis* Choisy exhibited potent neuroprotective activity through anti AChE and antioxidant activity [38].

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 [34].

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 [39].

CONCLUSION

Convolvulus pluricaulis Choisy, also known as Shankpushpi in the Indian subcontinent and is considered as Madhya rasayana in Ayurvedas. It is a well known medicinal herb and is believed to enhance certain aspects related to intellect and memory improvement. Apart from this there are also many other pharmacological aspects of this particular plant which are considered to be very useful in Ayurveda because of its Neuroprotective activity, immunomodulation, Antioxidant activity, Cardiovascular activity, Antiulcer and anticonvulsant activity, Anticonvulsant activity etc. It also contains active constituents mainly in the form of proteins, amino acids and the alkaloids-convolvine, convolamine, confoline, phyllabine, convolidine along hydrocarbons, aliphatic and sterol and certain other bio-chemicals. There is still lack of clinical data for its effectiveness and clinical trials are necessary to justify its traditional use. In future the standardization and stabilization studies on *Convolvulus pluricaulis*

leaves extract can be carried out which can help in proving it to be a promising source in pharmaceutical, medicinal as well as nutraceutical industry.

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