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An Important Ayurvedic Medicinal Herb *Argyreia speciose* (Vidhara): A Review

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ABSTRACT

The bioactive components and other natural substances present in herbal plants play a significant role in maintaining health. In the current scenario, various researchers and scientists are taking more interest in herbal plants to identify the immense potential of these plants used in multiple medicinal systems to treat several diseases. *Argyreia speciosa* is an important medicinal herb which is known as Vidhara in Hindi, Vridhadaru in Sanskrit and Hawaiian Baby wood rose or Elephant creeper in English. The plant is mainly distributed in the tropical regions of the world. In the ayurvedic medicinal system, this plant is used in many formulations to treat a vast array of human ailments. The plant is also well-considered in many folklore cultures around the world. The main active constituent present in the plant is ergoline alkaloids which carry great therapeutic potential. In the traditional medicinal system, *A. nervosa* is mainly used to treat sexual disorders, skin disorders, nootropics, ulcers, gonorrhoea, diabetes, etc. In addition, the seeds of this plant are hallucinogenic. The therapeutic properties of this plant include antioxidant, immunomodulatory, anti-inflammatory, analgesic, hepatoprotective and aphrodisiac. The medicinal usage of the *A. speciosa* plant in the ayurvedic and folklore culture, along with its pharmacological properties, is well described in the current review article.

INTRODUCTION

Argyreia speciosa (Linn f.) (syn. *Argyreia Nervosa*) (figure no. 1) is the traditional ayurvedic medicinal plant that belongs to the *Convolvulaceae* family. It is commonly known as elephant creeper, Hawaiian Baby Wood Rose and Vidhara or Bidhara. The plant is mainly found in the tropical regions of the world [1]. It is a large woody climber having white woolly hairy stems [2]. In Ayurveda, it is known as Vruddhadaruka and is used as a Rasayana. It is used in various ayurvedic formulations to treat various disorders such as diabetes, chronic gonorrhoea, ulcer, strangury, sexual disorders, anorexia, skin disorders, neurological disorders and associated with diuretic and aphrodisiac properties. It is also used as a nervine tonic [3,4]. The leaves and flower of this plant are associated with great ornamental value and is cultivated as a garden plant [5]. In various religious ceremonies, the seeds of this plant are used by juveniles for hallucinogenic and spiritual purposes in the United States [6,7]. Because of the hallucinogenic property, the seeds of the *A. Nervosa* plant are ingested by people either in dried or fresh form or with alcoholic extract [8]. The main active chemical constituent present in the seeds of this plant are ergoline, lysergamide or lysergic acid [9]. The roots of *A. Nervosa* showed immunomodulatory, antispasmodic [10], nootropic [11] activity. The plant is effective against diabetes, anaemia, obesity, tuberculosis, syphilis and cerebral disorders. It is also used as a cardiotonic, expectorant, digestive, carminative and appetizer [12]. The hypotension, spasmolytic and anti-inflammatory activity was also reported by the seeds of the *A. Nervosa* plant [13]. In Ayurveda medicinal system, it is used as Vriddhadaraka, i.e. the plant is associated with the anti-ageing property. The plant is reported to have aphrodisiac, nootropic, immunomodulatory, hepatoprotective, anti-inflammatory, wound healing, antidiarrheal, hepatoprotective, analgesic, antiviral, anti-hyperglycemic and CNS depressant activities [14]. Although the transportation or selling of *A. speciosa* is illegal, it is classified as a schedule 3 depressant by the DEA in the USA as per the psychoactive substances Act 2016. Local practitioners used the leaves of this plant as a stimulant and rubefacient in skin disorders

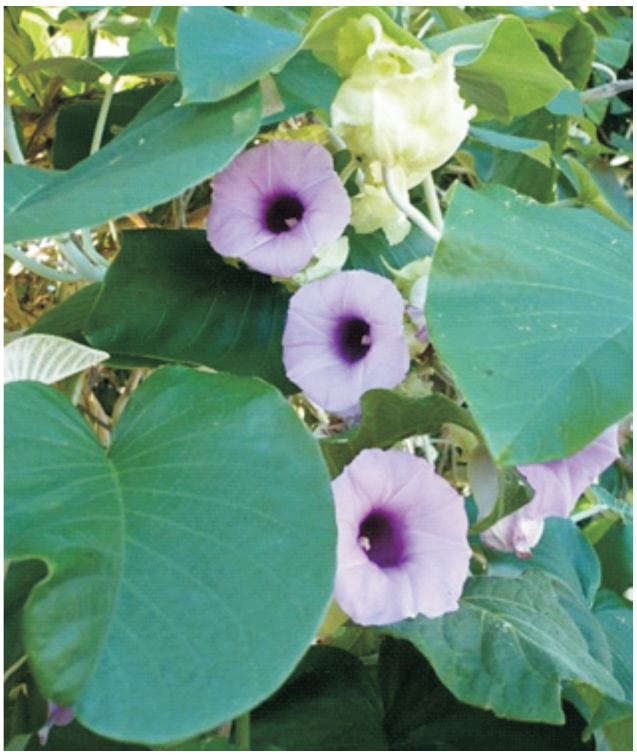

Fig. 1 : Vidhara plant.

[15]. Table no. 1 &2 represents the vernacular names and toxicological classification of *A. speciosa* plant.

Botanical description

A. nervosa is a large woody climber that belongs to the *Convolvulaceae family*. The plant can reach up to a height of 10 m or more. The stem of this plant is white and tomentose at the juvenile stage. The thickness of the mature stem is 25 mm with vertical ridges and several lenticels that are transversely elongated. It comprises of a large, alternate, long petiole, simple, acute, ovate, glabrous, silver-coloured heart-shaped leaves with a smooth appearance on the upper sides and beautiful silky hairs from the lower side. These leaves are 5-15 cm in length, while the leaf blade is 20-25 cm broad and 20-30 cm long. The flowers are

Table 1 : Vernacular names

English	Elephant creeper, wooly Morning-Glory
Hindi	Samandar-ka-pat, Samundarsokha, Ghav-patta, Bidhara, Ghavpatta
Gujarati	Samundrasosh, Vardharo, Undhha Chhati num pana
Bengal	Bichtarak, Guguli, Vijratadak, Vindhatadak
Marathi	Samandarshokh, Samudrasoka
Malayalam	Samudrapachcha, Samudrapala, Samudrastokam
Tamil	Ambagar, Peymunnai, Sadarbalai, Samuttrappalai
Telugu	Kokkiti, Chandrapoda, Samudrapachcha, Palasamudra, Samudrappala
Kannada	Chandrapada
Urdu	Samandarsotha

Table 2 : Taxonomical Classification

Taxonomical Rank	Taxon
Kingdom	Plantae
Subkingdom	Tracheobionta
Super-division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Solanales
Family	*Convolvulaceae*
Genus	*Argyreia*
Species	*speciosa*
Common name	Vidhara

large violet or lavender, funnel-shaped, sub capitate formed in the cluster. Black coloured seeds are present inside the pods of dried flowers. The fruit is smooth globose, yellowish-brown, round or berry-like, containing brown seeds. Three to five seeds are present in each flower pod [16]. The roots of this plant vary in thickness. Usually, thin roots are 2-4 mm in diameter and the thick roots are 5-25 mm in diameter with a rough exterior because of the presence of lenticels [17]. The seeds are more or less triangular (two flat or concave sides and the third side is convex) with 0.5 to 0.75 cm in length and 5 mm in breadth.

Geographical Distribution

A. Nervosa is mainly distributed in tropical countries worldwide. However, it is a native species of the Indian subcontinent. Because of its ornamental value, this plant is primarily grown in gardens due to its attractive leaves and flowers. In India, the plant is mainly found at an altitude of 500 m above the ground and found in Rajasthan, Uttarakhand, Bengal, Assam, Kerala, Karnataka, and Orissa. Also, it is seen as undergrowth in semi-deciduous forests and mostly at river banks and edges of lakes [18].

Phytochemical constituents

The chemical constituents found in *A. Nervosa* are flavonoids, ergoline alkaloids (0.5-0.9%), steroids, triterpenoids and lipids [19]. Ergoline alkaloids include lysergic acid-alpha-hydroxy ethyl amide, ergometrine, agroclavine, ergometrine, iso-lysergic acid-alpha-hydroxy ethyl amide, elymoclavine, festuclavine, chanoclavine I, chanoclavine-II and racemic chanoclavine II [20,21,22]. In addition, the seeds of the plant contain steroidal glycoside, (24R)-ergost-5-en-11-oxo-3beta-of-α-D-glucopyranoside [23]. Figure no. 2 represents the structures of

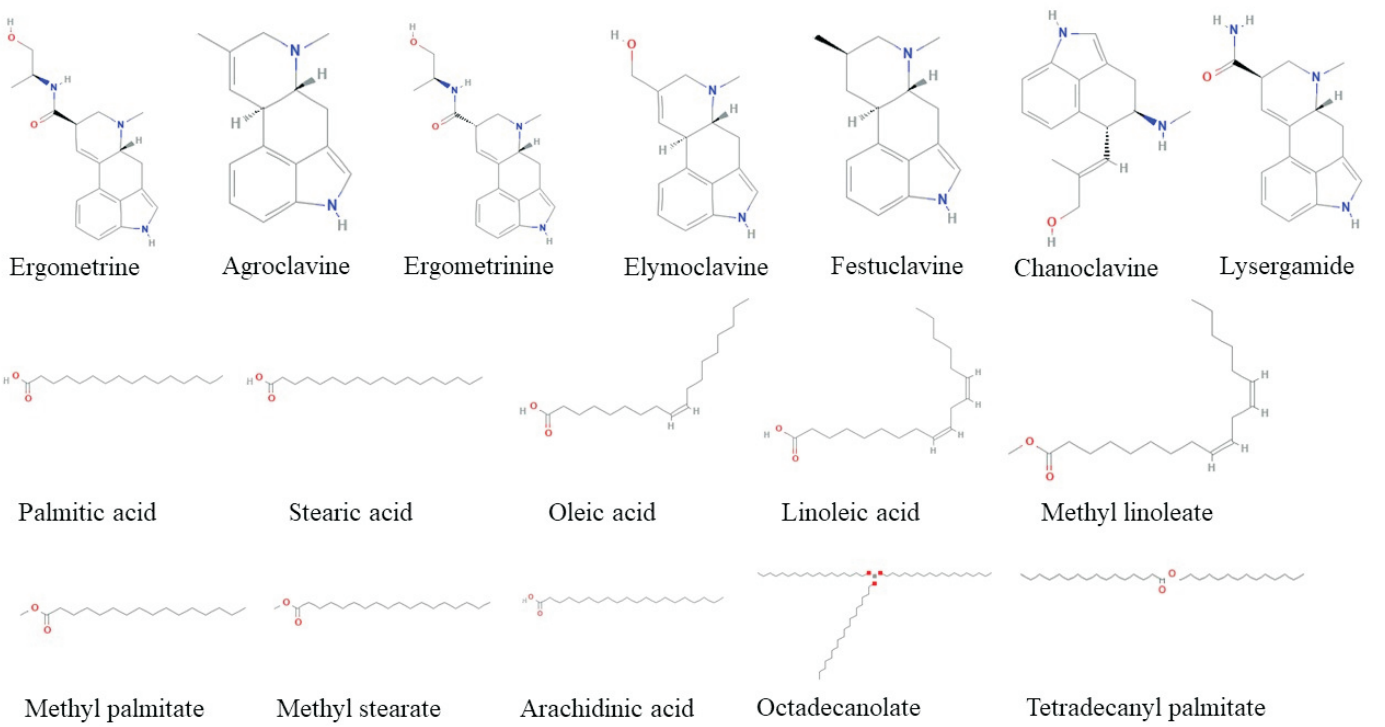

Fig. 2 : The chemical structures of some major phytochemical constituents of *A. nervosa* plant.

Table 3 : Rasapanchak (properties) of *A. speciosa* plant [38]

Sanskrit / English	Sanskrit / English
Veerya / Potency	Ushna / Hot
Vipak / Metabolic property	Madhur / Sweet
Guna / Physical property	Laghu / Light, Snigdha / Oily
Rasa / Taste	Katu / Bitter, Tikta / Astringent, Kshaye / Pungent

some major phytochemical constituents. The active psychoactive constituent present in seeds is lysergamide (LSA) that causes psychological reactions, and its consumption can be fatal. The seed oil constitutes palmitic acid (6.7%), stearic acid (29.1%), oleic acid (33.2%), linoleic acid (18.2%) and linolenic acid (6.1%). The other chemical constituents reported in the seed oil are methyl palmitate, methyl myristoleate, methyl myristate, methyl linoleate, methyl stearate, methyl nonadecanoate, methyl eicosanoate, methyl behenate [24], while myristic, lauric and arachidic acids were present in the trace amount [25]. The roots contain tetradecanyl palmitate, hexadecanyl p-hydroxy cinnamate, coumarin scopoletin, stigma steryl p-hydroxy cinnamate and disubstituted tetrahydrofuran 5, 8 oxidotetracosan-10-one [26,27]. The leaves consist of beta-sitosterol, quercetin, kaempferol, flavone glycosides, epi-friedelinol and acetate [28,29,30]. The fruit was reported to have beta-sitosterol, triacontanol, p-hydroxycinnamoyl, caffeic acid and octadecanolate [31].

Ayurvedic View

Ayurveda is a traditional medicinal practice used in India since ancient times. It primarily focuses on the maintenance of positive health and, secondarily, to cure diseases. There are several herbal plants used in the ayurvedic medicinal system to treat several disorders [32]. One such plant is *A. Nervosa* which is also known as Vrddhadaru. The description of this plant is mentioned in the Nighantu grants. It is also mentioned in Trikona Kanda in Ashtanga Sangraha. Vrddhadaru has been described in Karcveeradi Varga by Dhanvantri Nighantu. It is used as a Rasayana (rejuvenator) that helps in treating chronic ulcers, strangury and gonorrhoea [33]. However, Vrddhadaru is considered a controversial drug. The external application of the leaves helps in curing the itching, ringworm, eczema, other skin disorders and is used as a local stimulant and rubefacient. It is also used to prevent conception [34]. The roots of this plant are used to cure bronchitis, syphilis, pulmonary tuberculosis and are used as a brain tonic, aphrodisiac agent and rejuvenator [34,35]. One of the formulations of this plant named Ajmodadi Churna is used to treat dysentery, unilateral paralysis and rheumatic ailments [36,37]. In Ayurveda, *A. speciosa* is used as a supportive drug for exerting spasmolytic, hypotensive, antiphlogistic actions on the central nervous system. The rasapanchak (properties) of this plant is shown in table no. 3.

Formulations: Vriddhadaruka, Vriddhadaru kusama churna, Keshara paka, Amritabhallataka, Mahakamaeshwara modaka, Abhadi churna and Vriddhadarukadyasama ghrita, Vrddhadaruka kalpa, Nagaradi modaka, Banovit Capsule, Confido Tablet.

Actions and Properties

Kaphavatashamak: It alleviates the vitiated Kapha and Vata doshas of the body.

Santhanik karam: The plant is associated with wound healing property, helps in blood purification.

Abhyantranadisansthan: It strengthens the nerves, cures the CNS's weakness, beneficial for body aches and has nootropic action.

Pachansansthan: It helps in curing constipation, piles, indigestion, increases flatulence and act as an appetizer and laxative.

Raktavahsansthan: It is used to treat heart disorders and acts as a cardiotonic and anti-inflammatory agent.

Shvasansansthan: It is used to treat hoarseness of voice, cough, cold and beneficial for throat. It acts as an antitussive agent.

Prajanansansthan: It is used to treat sexual disorders of men, leucorrhea and acts as a uterine tonic. It is associated with aphrodisiac property.

Mutravahsansthan: It acts as an antidiabetic agent.

Saatmikaran: It acts as a rejuvenator.

Folk Uses

In the folklore medicinal system, the *A. Nervosa* plant treats various ailments and disorders such as chronic ulcers, gonorrhoea, sexual disorders and many more. The formulation names "Fortege" of this plant in combination with other species is used to treat the sexual conditions of males. In the Rajasthani tribe, the leaves of this plant are used to forbid conception and inflammation [39]. In Thailand, external application of the leaves is used to cure skin disorders. The seeds of the plant are used to cure diabetes, gonorrhoea, nervine disorders and chronic ulcer. The plant leaves are reportedly used as a poultice of wound, emollient, gleet, gonorrhoea, and antiphlogistic [40,41]. The dried root powder of *A. Nervosa* plant with an alcoholic drink is used to cure gonorrhoea. The Palliyar tribes use the root extract of this plant in the Western Ghats to treat gastrointestinal disorders. The root powder of *A. Nervosa* plant is given to the patients

suffering from dysuria. The tuber paste of this plant is used to treat gastric ulcers by the people of Lakhimpur. In other tribes, the plant extract is used by some local practitioners to treat sexual disorders in males and give positive results in smallpox [42]. The flowers, leaves and root parts of the plant are used to cure cough and rheumatoid arthritis in the Wayanad district of Kerala [43]. The root powder, in combination with chilled milk and misri is used to cure different ailments [44]. In some parts of India's Bihar state, the seeds of vidhara are eaten because of the presence of proteins, fatty acids, and amino acids [45].

Modern View: Adulteration and substitution are intentional and unintentional practices. In the modern world, the demand for herbal drugs has increased due to their several advantages over synthetic drugs. The degradation in the quality of these herbal drugs results from increased market demand that results in contamination and adulteration practices [46]. The substitution and adulteration practices are done by substituting artificially manufactured drugs, toxic materials, inferior drugs and many more practices. As a result of this, people have lost faith in these herbal drugs [47,48]. The rate of toxicity has increased due to the presence of various adulterants. As per WHO, if more than 5% of the original drug is admixed with other substances, even if they are extracted from the same plant would be rejected. Deforestation, loss of habitat, overexploitation and unavailability of the natural plant are the other factors responsible for the adulteration practices [49]. So, there is a need to develop a Herbal Authentication System (HAS) that can serve as a regulator and also helps in improving the quality of the herbal trade [50].

Reported Pharmacological and Therapeutic Properties

Various reported studies suggested that the *A. Nervosa* plant is associated with different therapeutic and pharmacological actions. Some of the reported studies of this plant are discussed below.

Antipyretic: The antipyretic activity of the plant was examined against yeast induced pyrexia in rats. The aerial part extract showed significant antipyretic activity by inhibiting the prostaglandin synthesis in the hypothalamus [51]. In another study, an aqueous extract of leaf was evaluated for the antipyretic activity against yeast induced pyrexia in Swiss albino rats. The fever-induced rat was administered with the leaf extract at different dosages, i.e. 300, 400 and 500 mg/kg body weight and compared with the standard drug paracetamol (150 mg/kg body weight). A significant antipyretic activity of the aqueous extract was observed after 2 hours of the administration at the dosage of 300, 400 and 500 mg/kg body weight compared to the standard drug [52].

Aphrodisiac: The *in vivo* study was conducted in male rats to evaluate the aphrodisiac and spermatogenic potential of the roots of the *A. Nervosa* plant for the treatment of male infertility. The alkaloid fraction was orally administered at 10, 25 and 50 mg/kg in a rat model. At 50 mg/kg dosages, a significant increase in serum testosterone and 146.7% increase in serum cholesterol was observed. A substantial rise in the intromission frequency and mounting frequency was also noticed at the exact dosage. A reduction in the mounting latency by 32% and intromission latency by 15.88% was observed. The weight of testes, prostate, epididymis and seminal vesicle was also increased. The sperm concentration was also increased by 30.26% in the rat model [53,54].

Antioxidant: The *in vitro* study was conducted to examine the antioxidant potential of the ethanolic extract of *A. Nervosa* by using 2,2-diphenyl-1-picrylhydrazyl (DPPH), DNA sugar damage, superoxide radical scavenging and ferric reducing antioxidant power methods at different dosages. Maximum antioxidant activity was noticed at the dosage of 150 µg/ml as compared to 50 and 100 µg/ml of dosages [55].

Wound healing: The ethanolic and water extract prepared from the leaves of *A. Nervosa* plant was examined for the wound healing activity in the mice model. The extracts were applied topically for 14 days in the mice model after induction of the wound. Both the extract showed significant wound healing activity, but the water extract was more potent. The ethanolic extract ointment showed a significant wound healing effect in diabetic and normal rats [56]. Water extract showed a significant rise in the rate of hydroxyl proline content, wound contraction, breaking strength and decreased rate of epithelization point.

Antimicrobial: The ethanolic extracts of the leaves showed significant antibacterial activity against various antibacterial strains such as *Bacillus subtilis, Proteus Vulgaris, E. coli* and antifungal activities against *Aspergillus flavus, Aspergillus niger* and *Candida albicans* [57]. The seed oil of the plant was found to show antifungal activity against *Colletotrichum capsici, Cryptococcus neoformans, Aspergillus niger, Aspergillus sydowi* and *Fusarium oxysporum* [58]. In another study, the alcoholic extract exhibited significant antibacterial activity against *Staphylococcus aureus* [59].

Hepatoprotective: The methanolic root extract showed significant hepatoprotective activity by decreasing serum alanine aminotransferase, alkaline phosphatase and aspartate aminotransferase levels in CCL_4-treated rats [60]. In another study, the ethanolic and ethyl acetate root extract of the plant exhibited hepatoprotective activity by reducing the elevated enzyme levels induced by CCl_4. In addition, it protected the structural integrity of hepatocyte cell membrane or regeneration of damaged liver cells at the dosage of 200 and 400 mg/kg [61].

Immunomodulatory: The ethanolic extract of *A. speciosa* was examined for the immunomodulatory activity against the mice model. The oral administration of the extract delayed the hypersensitivity reaction induced by sheep red blood cells and oxazolone at a dosage of 50, 100 and 200 mg/kg. Also, it increased the production of circulating antibody titre in mice in response to sheep red blood cells. Furthermore, the chronic administration of the ethanolic extract alleviated the total white blood cell count and restored the myelosuppressive effects induced by cyclophosphamide. Thus showed immunomodulatory activity. It was also reported that 95% of the root ethanolic extract stimulates humoral and cellular immunity [62].

Analgesic and Anti-inflammatory: The root methanolic extract of *A. speciosa* was evaluated for analgesic and anti-inflammatory activity in a rat model. It was found that the extract at different dosages reduced the number of acetic acid-induced writhing when compared with the control samples. Also, the methanolic extract mitigates the carrageenan-induced paw edema in rat models at the dosage of 100 and 300 mg/kg [63]. The anti-inflammatory activity of the plant was studied using aerial parts, which showed that the methanol at the dosage of 300 mg/kg and ethyl acetate extract significantly reduced the paw edema volume compared with the standard drug ibuprofen [64]. In another study, the hydro-alcoholic extract of the plant exhibited significant analgesic activity at the dosage of 100, 200 and 500 mg/kg using the tail-flick test in rats and acetic acid-induced writhing test in

mice model [65].

Antidiabetic: The researchers used the ethanolic extract of the plant against normal and alloxan-induced diabetic rats to evaluate the antidiabetic activity. The results showed a significant reduction in the blood glucose level and increase of liver glycogen content in diabetic rats. In addition, a considerable increase in the glucose-6-phosphatase and a decrease in LDH was also observed. The reference drug used was Glibenclamide [66]. Also, the dried seeds of A. speciosa showed hypoglycemic activity [67].

CONCLUSION

An important medicinal plant named *Argyreia Nervosa* is used in various medicinal systems to treat numerous disorders since ancient times. This plant is associated with various traditional, ethno medicinal and pharmacological activities. It is pretty evident from the reported studies that the Vidhara plant is a plant of significant therapeutic potential. The much explored pharmacological properties of the plant are aphrodisiac, immunomodulatory, antidiabetic, hepatoprotective, wound healing and antiviral activities. The main active constituents present in the seeds of *A. speciosa* plant are ergoline alkaloids. As the plant is used widely in the herbal drug industry, this plant needs to be cultivated on a large scale, which will help in the country's financial growth along with the development in the herbal field industry. Also, the plant needs to be explored more in the area of research to identify the unexplored phytochemical constituents and pharmacological properties of this plant.

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