Review on Argyreia speciosa sweet: medicinal use and biochemical activities

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Abstract
Argyreia speciosa Sweet (Family Convolvulaceae) is a significant 'rasayana' plant that is heavily utilised as an adaption in the Ayurveda medical system Hawaiian Baby Woodrose, Elephant Creeper, and Woolly Morning Shine are some of its common English names, its Sanskrit name is Vridhadaraka. which translates to "anti-aging." Growing throughout India, it is a large climber. The Ayurvedic Materia Medica gave it lots various pharmacological characteristics. In cases of rheumatism and neurological diseases, the root is used as a shift tonic. A number of phytochemicals have been listed from the plant as well as been used traditionally and by diverse tribes to treat various human illnesses. Hepatoprotective, immunomodulatory, anti-inflammatory in nature anti-rheumatic, antioxidant, and anti-oxidant pharmacological actions have also been noted. The administration of many current medications has been restricted due to unfavourable side effects, so it is important to investigate the potential of this medication in the management of neurological, rheumatic, and liver conditions. This article discusses studies on the therapeutic applications of this significant herb.
Keywords: Argyreia speciosa, Argyreia nervosa, Immunomodulation, Antimicrobial, Antioxidant, Adaptogenic, Elephant creeper, Hawaiian Baby Woodrose

Introduction
Specific Argyreia The sweet syn lives in tropical areas of the planet. Hawaiian Baby Woodrose is the famous moniker for the plant Argyreia nervosa (Burm. f.) Bojer. The shrub is a common sight across the country India up to a height of 500 m and is used a a plant for decorating in gardens due to its rich green leaves and rose-purple blooms. [1]. Bengal, Assam, Orissa, Uttarakhand, Rajasthan, Karnataka, and Kerala are all home to the plant. It typically grows as undergrowth in semideciduous forests1 and in slightly damp areas like riverbanks, lake borders, etc. Ipomoea petaloidea Choisy and Ipomoea biloba Forssk. are sometimes referred to as Vidhara and Vriddhadaruka. [2]. However, the Indian Materia Medica refers to A. speciosa as Vridhadaraka. [3]. A number of formulations, including Vriddhadarukasma churna, Keshara paka, Amritabhallataka, Mahakamaeshwara modaka, Vriddhadarukadyasama ghrita, and Abhadi churna, contain it as a key component [4].

Figure1- Argyreia speciosa

It is a woody climber that twines and can grow up to 10 meters or higher in height. New shoots have thick white pubescence covering them [5]. The 5–15 cm long, simple, and alternating leaves have long petioles. The oblong to broadly ovate-cordate leaf blade measures 20–30 centimetres en length and 20–25 centimetres in breadth. [6]. Upon thick, white in colour, and tomentose peduncles, large, showy, funnel-shaped blooms on short pedicels appear in terminal bracteate cymes. The flowers are coloured dark purple or pale to dark rose, regular, and subcapitate. Fruits are smooth, globose, indehiscent, and unevenly crumbling berries that are yellowish brown in colour and range in diameter from 1.2 to 1.8 cm. They contain two or four seeds that are imbedded in a resembling pulp [7]. The recognised parts are the roots and leaves. It can be spread by both seeds and stem cuttings, which readily take root.

Plant chemical components

Numerous substances from the plant have been identified, including those from the chemical families ergoline alkaloid compounds, lipids, flavonoids, steroids, and triterpenoids [8] Ergoline alkaloid compounds, including lysergic acid-hydroxy ethylamide, ergometrine, and ergometrinine, and iso-lysergic acid-hydroxy ethyl amide, range in concentration from 0.5% to 0.9%. Racemic chanoclavine II, elymoclavine, festuclavine, agroclavine, chanoclavine-I, chanoclavine-II, are found in from plant [9].

Additionally, zThe seeds were used to extract the steroidal glycoside argyroside, also known as (24R)-ergost-5-en-11-oxo-3-ol-D-glucopyranoside. [10]. The seed induces hallucinations. Lysergamide (LSA), the main psychoactive component found in seeds, creates psychological reactions and can be lethal when consumed by people. Seed extract's LD50 is 500 milligrammes per kilogramme body weight [11].

As per study of Kelkar et al., the fatty acid breakdown of seed oil is as follows: palmitic (6.73%), oleic (33.2%), stearic (29.13%), behenic (6.64%), linoleic (18.22%), and linolenic acid (6.1%). Its seeds contain triacontanol, a C30 straight chain alcohol [12]. As stated by Batra and Mehta, it has over 20 different components in its seed oil. Examples include methyl myristoleate (2.52%), methyl myristate (0.12%), and methyl palmitate (12.12%). 6.8% of methyl linolenate, 7.6% of methyl linoleate, 27.5% of methyl oleate, 5.6% of methyl stearate, 3.4% of methyl sterate, 0.7% of methyl nonadecanoate, 1.2% of methyl eicosenoate, 1.3% of

methyl eicosanoate, and 0.3% of methyl behenate. There were additional traces of lauric, myristic, and arachidic acids found in the seeds. [13].

The roots included tetradecanyl palmitate and a disubstituted tetrahydrofuran 5, 8, oxidotetracosan-10-one. Additionally, 7-OMe-3-sulfate has been identified in the roots. [14]. Spectral and chemical analyses have identified a coumarin glucoside found in the root system of A. speciosa as 6-methoxy coumarin-7-O-D-glucopyranoside (mp 208°C)[15]. From the leaves, epi-friedelinol, -sitosterol, and its acetate have been discovered. Quercetin and kaempferol23 as well as flavone glycosides 7,8,3,4, and 5-penta hydroxy flavone 5-O-D-glucopyranoside and 3-O-L-rhamnopyranoside of kaempferol were also discovered through phytochemical analysis of leaves [16]

Biological processes

For various plant components, a variety of bioactivities including anti-ulcer, anti-tumor, antidiabetic, hypoglycemia, hypotensive, spasmolytic, anti-filarial, anti-microbial, and CNS depressive have been documented. Additionally, aphrodisiac, diuretic, anabolic-like, anti-bacterial, anti-fungal, anti-viral, and anti-fertility properties were reported [17]. The root has aphrodisiac, alterative, a diuretic tonic, antigonorrheic, intelligence-promoting, anti-inflammatory, and antirheumatic properties. Additionally, it has carminative, alterative, emollient, digestive, aperient, thermogenic, and bitter properties [18]. It aids in treating a variety of conditions including anorexia, weight loss, indigestion, bloating, colic, chronic ulcers, ascites, haemorrhoids, hemiplegia, neurologic numbness, neuralgic symptoms, brain illnesses, synovitis, and general weakness. It is used to treat obesity since it has emaciation qualities. In addition, leucorrhoea, diabetes, syphilis, infected wounds, and cough are treated with it. Roots have a cardiotonic effect, making them beneficial for conditions like pulmonary TB, bronchitis, and pharyngitis [19]. The root itself is used to treat ongoing ulcers, gleet, gonorrhea, and stranguria within the Yunani medical system. The powder root is administered with milk in synovitis [20]. The root's extracts in Methanol, Benzene, Chloroform, and Petroleum Ether were not hazardous when administered at doses between 100 and 750 mg/kg intravenously for 72 hours. The leaves are widely utilised in India to cure tumours, boils, carbuncles, and ulcers. In Maharashtra, the folded stage of the leaf is gathered before opening, and the full leaves are used elsewhere [21]. The come to a boil carbuncle, or malignancy will contract and disappear when a leaf is placed with its ventral side contacting the body and then wrapped. The Bengali locals utilise a type of naturally impermeable piline that is produced by the leaves' thick under layer of silky hairs as a maturing [22]. The white underside of the leaf serves to act rubefacient and promotes the development of boils. The leaves are used as a rubefacient, local stimulant, and emollient in addition to being vesicant and antiphlogistic. The external application of the leaves as moisturising rubs for boils, swellings, carbuncles, nasty ulcers, wounds, and externally in skin illnesses accelerates maturation, suppuration, and absorption [23]. Additionally, it is applied topically to treat eczema and ringworm infections. To combat obesity, it is massaged on the skin after being combined with vinegar [24]. Three phytosterolins that have hypoglycemic and CNS depressive properties are present in the leaves. According to reports, the leaves can treat diabetes.

The extract from the seed has hypotensive and spasmolytic characteristics, and it is CVS (cardio-vascular system) active [25]. The percentage that contained three alcohols, one of which being ergometrine, was what caused the hypotensive activity.

It is illegal to utilise the seeds as a hallucinogen. After eating seed, there have been reports of toxic psychosis including hallucinations, directional problems, and psychomotor agitation and anxiety [26]. The natural alkaloids lysergacidamide, lysergacidethylamide, and related structurally related isomers (lysergic acid diethylamide, or LSD) were present, which is the reason for the (psycho)pharmaceutical effect. It produced psychic effects that were considerably dissimilar from that of LSD but resembled those of scopolamine [27].

Pharmacological studies

Sexual disorders

The native drug "Fortege," which includes In a study involving men with male sexual disorders, A. speciosa, one of its main ingredients, was discovered to be beneficial in conditions such as erectile failure (EF), ejaculating spermatorrhoea, and impotence without having any adverse side effects. [28]. Another medication called Spemen, which contained A. speciosa among other plant-based components, showed anabolic and androgenic action in rats [29].

Gastric ulceration

When taken orally twice per day for five days, the A. speciosa flower's ethanolic extract (50 percent by volume) had a dose-dependent effect on ulcer protection (100 to 200 mg/kg) [30]. A dose of 150 milligrammes per kilogramme given twice daily for ten days had a healing effect on an ulcer index caused by acetic acid (50%) with fewer perforations [31].

Joint pain-relieving and anti-inflammatory

It is used to treat inflammatory problems in the systems of medicine practised by the indigenous people [32]. The ethanol extract to roots was found to significantly lessen paw edema caused by the carrageenan and Freud's full adjuvant at doses of 50-200 mg/kg. [33]. At doses of 50–200 mg/kg, an ethanol extract from roots was found to greatly reduce paw edoema brought on by carrageenan and Freud's complete adjuvant. 1% carrageenan was used to provoke inflammation [34]. At three hours, the extract notably displayed anti-inflammatory effect [35].

Antimicrobial and phytotoxicity

A vitro antifungal and antibacterial activity was shown by the seed oil. Several Gramme positive and Gramme negative bacteria as well as phytopathogenic fungi were resistant to its antiseptic activities [36]. When isolated from roots, hexadecanyl p-hydroxycinnamate and scopoletin exhibited strong antifungal action against Alternaria alternate [37]. Both test materials showed phytotoxicity in the form of wheat seedlings' roots growing unfavourably. Hexadecanyl p-hydroxycinnamate induced an inhibition of 79.42% at a concentration of 250 ppm, while scopoletin caused an inhibition of 91.57%. High amounts (1000 ppm) entirely prevented wheat's root growth [38].

Using in vitro and animal studies, Habbu et al evaluated the antibacterial activity of various A. speciosa root constituents and flavonoid sulphates toward microbes, fungi, and a

Mycobacterium tuberculosis H37 Rv susceptible strain. [39]. evaluated the antibacterial activity of flavonoid sulphates aQuercetin 3'7 di-O methyl 3-sulphate and kaempferol 7-O methyl 3-sulphate and the ethyl acetate parts inhibited the growth of M. tuberculosis Rv responsive strain at MIC values of 25 and 50 g/ml, respectively. The ethanol portion significantly suppressed Gram-positive organisms with a MIC of 31.25 g/ml. [40]. Flavonoid sulphates showed greater inhibition against the Gram-negative pathogen Klebsiella pneumoniae with a lower MIC (2 g/ml), which is practically on par with industry norms [41]. With a MIC of 100 g/ml, the chloroform fraction alone demonstrated substantial antifungal activity. It was also noted that flavonoid sulphates and readily accessible antitubercular medications worked in concert. When compared to chloramphenicol, the flavonoid sulphates and ethyl acetate portion had the least detrimental effects on erythrocytes. [42].

Immunomodulatory

The analysis by Gokhale et al. indicates that roots have an immunomodulatory effect [43]. The ingestion of an ethanolic extract to mice at doses of 50, 100, and 200 mg/kg enhanced the delayed-type hypersensitivity response brought on from both sheep blood vessel cells and oxazolone in a dose-dependent manner. [44]. It greatly increased the number of circulating antibodies produced in mice [45]. The overall white blood cell counts significantly increased. after receiving chronic dose of the ethanolic extract, and the myelosuppressive effects brought on by cyclophosphamide were also recovered [46].

Nootropic

The aqueous root extract at doses of 100 and 200 mg/kg effectively reversed amnesia caused by scopolamine, diazepam, and ageing. It also enhanced memory and decreased acetyl cholinesterase levels in brain homogenate, indicating that it may be helpful in reducing learning and memory deficits, especially in elderly mice. [47].

Antioxidant and adaptogenic

Strong in vivo antioxidant activity was shown by the reduction of super oxide dismutase (SOD), catalase, which and peroxidase activity in living cells after administration of the ethanol extract and the extract of ethyl acetate of roots at dosages of 200 and 400 mg/kg, respectively. [48].

The total white blood cell count was markedly improved after receiving chronic dose of the ethanolic extract, and the myelosuppressive effects brought on by cyclophosphamide were also recovered [49].

Nootropic

Scopolamine, diazepam, and aging-related amnesia could all be effectively treated with the aqueous extract of roots at dosages of 100 and 200 mg/kg. Additionally, it enhances memory and reduced levels of acetyl cholinesterase in brain homogenate, suggesting that it may be useful in decreasing memory and learning deficits, particularly in elderly mice. [50].

Adaptogenic and antioxidant

Strong in vivo antioxidant activity was demonstrated by the reduction of liver super oxide dismutase (SOD), catalase, and peroxidase activity in the face of ethanol extract and ethyl acetate takes of roots at dosages of 200 and 400 mg/kg, respectively. [51]. The restoration of

a substantial number of parameters in the investigated stress models revealed that ethanol fraction (100 and 200 mg/kg p.o.) and quercetin and kaempferol (25 mg/kg orally) from A. speciosa root boosted experimental mice's capacity to bear non-specific stress. [52]. For both short and chronic stress models, the tested concentrations of separated flavonoids and ethanol fraction were able to normalise altered blood biochemical markers and ulcer severity [53]. Spontaneous radical scavenging activity was credited with contributing to antistress action [54].

Anticonvulsant

The root itself is valued as a complementary tonic and beneficial for disorders of the nervous system [55]. The hydroalcoholic isolate of A. speciosa roots showed an anticonvulsant effect on rats at dose of 200 and 400 mg/kg. [56].

Hepatoprotective

High in vivo antioxidant activity was seen by the reduction of liver super oxide dismutase (SOD), catalase, and peroxidase activity in the face of ethanol extract and ethyl acetate takes of roots at dosages of 200 and 400 mg/kg, respectively.[58].

Conclusion

A. speciosa is a medicinal plant that has been utilised for thousands of years and is attributed with countless medical benefits. Its pharmacological potential is broad and varied, and its prospects are bright within the area of medicinal plants. The plant can thrive in climates that are both tropical and subtropical. There are many formulations on the market that contain this plant. It is a prime candidate for more pharmacological and phytochemical study, which could result in the creation of a brand-new herbal medicine with therapeutic benefits. From the above information on A. speciosa, which concludes the utilization of herbal medicine may be beneficial and effective in the treatment and management of the diseases. Although, isolation and purification of chemical constituent is still a complex task so that one can use as therapeutic moity.

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