



Multifarious uses of *Argyreia nervosa* (Burm. f.) bojer in traditional Indian medicinal systems: A mini-review

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Abstract

The heritages of Indian traditional knowledge of herbal medicinal practices are far rich and flow orally through generations. Extracts of different plant parts are routine in use among ethnic and rural people to date. The traditional medicinal uses of *Argyreia nervosa* (Burm.f.) Bojer is one such example of the high valued heritage of knowledge-based indigenous herbal practices in India. The woody vine plant *Argyreia nervosa* is an important medicinal plant used traditionally for the cure of various diseases, including stomach complaints, sores on foot, smallpox, syphilis, dysentery and diarrhea, ringworm, eczema, itching and other skin related infections for their potential phytochemicals like triterpenoids, flavonoids, steroids, argyreioside, epifriedelinol, triacontanol, lysergamide alkaloids. The chapter aims to provide insight into various parts of the plant's healthcare applications in traditional Indian medicinal contexts.

Keywords: multifarious, argyreia, traditional knowledge, vine, phytochemical, lysergamide

Introduction

The traditional wisdom of indigenous medicinal plant species utilization available locally is a source of protection and health restoration over millennia^[1]. Ethnobotanical values of herbal medicines are the prime source of healthcare services in rural parts of the developing world for easy availability and less expense. India is one of the largest hubs of ethnic tribes with a wealth of diverse forest resources. The health care practices in ethnic tribes and rural people in India lean on traditional medicines to close intimacy with nature.

The traditional indigenous medicinal practices in India are among the most ancient and profound customs that keep on going to date. The rich heritage of traditional medicines is popularly practiced in pre and post-Ayurvedic ages, and detailed therapeutic applications are provided in medicinal masterpieces, including *Materia Medica*. The indigenous system of medicines (ISM) recognized by Ayurveda, Siddha, and Yunani was validated extensively in Indian folk-medicinal practices^[2]. The mining of chemical extraction procedures and characterization of active ingredients in modern-day science has led to the growing popularity of traditional herbal medicines. The potential therapeutic agents present in folk medicine are a center of attention for new and synthetic drug discovery during the decades. There are tremendous opportunities to underpin the potential validation of traditional medicinal practices for novel drug discovery, as documented in rich literature of ancient and recent times. Extensive documentation on traditional medicinal practices like Kumar S. J. U. *et al.* (2019) in ethnic communities from South India enlisting 2000 medicinal plant species belonging to 1033 genera and 215 families may lead to the potential source of novel drug discovery in modern times with due course of research^[3]. The traditional medicinal uses of *Argyreia nervosa* is one such example of the high valued heritage of knowledge-based indigenous herbal practices in India. A diverse group of research was carried out on phytochemical constituents and their implications in different ailments and diseases in various model organisms to validate their potential role for indigenous practices during age-old tradition.

Botanical description of the plant

The dicot genus *Argyreia* Lour. belonging to the family Convolvulaceae is represented by about 125 species with worldwide distribution and possesses great ethnobotanical significance as a traditional medicine^[4]. *Argyreia nervosa* (Burm. f.) Bojer syn. *A. speciosa* (L. F.) Sweet (commonly known as woody Morning Glory) is a perennial climbing shrub with a woody tomentose stem. The fascinating Sanskrit name of the species is "Vridhadaraka", meaning anti-aging plant. The species is native to the Indian subcontinent^[5, 6] ranges up to 500 m of altitude and is distributed throughout Bengal, Assam, Orissa, Uttarakhand, Rajasthan, Karnataka, Kerala^[4, 7]. The twining vine reaches up to a height of 10 m or more thickly covered with pubescent hairs. Leaves are simple, alternate, glabrous, petiolate, 6-20 cm long. The lamina is ovate or ovate-cordate, moderately large with 15-35 cm in length and 12-25 cm in the breadth. The inflorescence is axillary cyme borne on a stout peduncle. Flowers are large, pedicellate, funnel-shaped with showy corolla. The calyx is lobed, long, ovate, obtuse, and pubescent; Corolla pale yellow campanulate, valvate, corona single, with five fleshy scales; Ovary glabrous; Fruits are regarded as berries with globose in shape, 3 to 5 seeds present, commonly 4 in individual flower.

Marker phytochemicals and broad-spectrum utilities

The plant is attributed with numerous medicinal properties in traditional Indian folk-medicine, including Ayurveda [8] and Materia Medica [7], due to a wide range of phytochemicals constituents. The vine possesses countless secondary metabolites, including triterpenoids, flavonoids, steroids, argyreioid, epifriedelinol, triacontanol, lysergamide alkaloids [7]. The plant is pharmacologically studied for various ailments, including nootropic, aphrodisiac, immunomodulatory, hepatoprotective, antioxidant, anti-inflammatory, anti-hyperglycemic, anti-diarrheal, antimicrobial, antiviral, nematicidal, antiulcer, anticonvulsant, analgesic and central nervous depressant activities [7-12]. The entire plant is used in diseases, including stomach complaints, sores on foot, smallpox, syphilis, dysentery and diarrhea in traditional Indian folk medicine. The leaves are used extrinsically to treat ringworm, eczema, itching and other skin-related diseases. The roots are widely used as a cure for anemia, aphrodisiac and anti-inflammatory diseases in humans. Overall, the plant is a rich source of psychoactive compounds regulating the brain and nervous systems [9]. Lysergic acid amide (LSA) from seeds of the plant acts as a hallucinogen and psychoactive [10].

In phytochemicals analysis of ethanol, methanol, chloroform, N-hexane, aqueous, and hydro alcohol extracts of leaves and roots of *A. nervosa*, Geetharani *et al.* (2020) reported the presence of alkaloids, carbohydrates, proteins, steroids, phenols, tannins, flavonoids, and saponins [5] compounds giving the utmost importance in phytochemical analysis (Refer Table 1 and 2). Gokhale *et al.* evaluated the anti-inflammatory and anti-arthritis properties of the ethanol extract in mice and rat models with significant remedy [13] and immunomodulatory activity in mice [14]. Methanol and ethyl acetate extract of whole aerial parts and hydroalcoholic extract of roots were evaluated for antipyretic activity in rats [15, 16]. Analgesic and anti-inflammatory activity of a hydroalcoholic extract of root were assessed in rat and mice models to evaluate traditional knowledge-based practices [17]. Aphrodisiac properties of roots, flower and leaf extracts in mice model was evaluated with simulated sexual activities in males [18].

Validation of plant-based extracts in model organisms

Ali S. A. *et al.* (2011) reported a few novel coumarin compounds identified as 7- hydroxy-6-methoxycoumarin; 6, 7-dihydroxy coumarin; furanocoumarin and scopoletin-7-O-β- glucopyranoside from the ethanolic extract of aerial parts that showed enhanced activities against hyperglycemia in diabetic rats [22]. The antibacterial activities of alcoholic and aqueous extracts of *Argyrea nervosa* were reported against five bacterial strains viz., *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Citrobacter* and *Klebsiella pneumonia* [23]. The leaf extracts coated with silver nanoparticles showed a potential inhibition of growth in foodborne bacteria [24]. The antifungal activities of ethanol extract from leaves were evaluated against *Candida albicans*, *Aspergillus niger*, *A. flavus*, *Trichoderma* spp., *Fusarium proliferatum*, *Microsporium* spp. and *Trichophyton* spp. that inhibit fungal growth in a dose-dependent manner [20].

Table 1: Potential phytochemical compounds present in different plant parts.

Plant parts	Significant chemical constituents	Reference(s)
Leaves	1-triacontanol, epifriedelinol acetate, epifriedelinol, β-sitosterol, flavonoids, quercetin, kaemperol, flavonone glycosides	[19]
Roots	Tetradecanyl palmitate, 5,8-oxidotetraco san-10-one, aryl esters	[9, 19]
Fruits	n-triacontanol, β-sitosterol, p-hydroxy cinnamoyloctadecanolate, caffeic acid	[9, 20]
Seeds	Chanoclavine, ergine, ergonovine, isoergine, fatty oils (myristoleic, myristic, palmitic, linoleic, linolenic, oleic, stearic, nonadecanoic, eicosenoic, eicosanoic, heneicosanoic and behenic acids), argyroside, lysergamide	[4, 8, 9, 19, 21]

Table 2: Indigenous uses of the plant parts against various ailments.

Plant parts	Multifaceted use	Reference(s)
Leaves	Leave extracts are externally used in the treatment of ringworm, eczema, itch and related skin diseases, used to prevent boils	[8]
	Leaves used as a poultice applied in chronic ulcers	[25]
Roots	Root parts used to cure gleet, gonorrhea, strangury, chronic ulcers, rheumatism and diseases of the nervous system; root extracts with anti-filarial properties	[7,8,26]
Fruits	Effective against Vaccinia virus	[27]
Flower	Oral intake of ethanol extract of flower increases healing against gastric ulceration in mice	[28]
Seeds	Seed ingestion act as a hallucinogen with vigorous effects	[21,29]

Table 3: Tribe/region-wise traditional use of the species in the Indian sub-continent.

Tribe/Region	Traditional medicinal practices	Reference(s)
Lodha tribe	Dried root powder with liquor to treat gonorrhea, root paste with milk to treat painful urine discharge	[7]
Rajasthani tribe	Leaves used to prevent constipation	[9, 12]

Kurichiya tribe (Kerala)	Leaf, flower and root parts used for treating the cough and rheumatoid arthritis	[30]
Northern parts of India	Young unfolded leaf used for wound healing (experimentally showed the healing properties in Swiss albino mice)	[31]
Tribal communities (Mulshi, NWG)	Ripe fruits pulp is eaten as raw	[32]
Rayalaseema region (SWG)	Leaf and roots used against Leucoderma	[33]
Tribal communities (MB)	Leaves used against chronic ulcers	[25]
Dhar district, MP	As for vegetables	[34]
Zou tribe (Manipur)	Pods used as vegetables or in chutneys	[35]
Reang tribe (Tripura)	Root paste used in a sprain	[1]
Adilabad district (AP)	Leaf paste used against hydrocele in the affected area	[36]
NWG: Northern western Ghats; SWG: Southern western Ghats; AP: Andhra Pradesh; MB: Mayurbhanj, Orissa; MP: Madhya Pradesh		

Conclusion

Argyreia nervosa is well documented for its potential role in Indian traditional medicinal services in ethnic and rural communities. The phytochemicals screened during research showed enormous possible remedies against a broad range of ailments. The utility of various parts of the plants, including roots, leaves, seeds and flowers, are used based on available traditional knowledge in Indian ethnic and rural culture (Table 3). The psychoactive natures of the seeds are mainly studied for hallucination and effects on the central nervous system. For their wide range of healthcare properties, the plant species are conserved as sacred groves among indigenous tribes of India.

Future directions

There are potential scopes in deciphering the role of traditional medicinal practices in India due to the age-old history of utilization in community studies. *Argyreia nervosa* is such an example of a fundamental improvement in formulating new drugs from their extracts for healthcare applications for multiple ailments in the future.

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