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A review on worm killer: *Aristolochia bracteolata*

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Abstract

Aristolochia bracteolata is an important medicinal herb and it is an original of Indian subcontinent and has become naturalized in the tropical and sub-tropical areas around the world. The plant is usually gathered from the wild and is used locally in traditional medicine. It is sometimes cultivated for medicinal use in India. In the indigenous system of medicine, the plant was used as purgative, antipyretic & anti-inflammatory agents. The root part has antifungal and antibacterial activity and was used to treat syphilis, gonorrhoea, and skin diseases and also used during labours to increase uterine contraction. Its leaves are bitter and anti-helminthic, antiulcer, anti-plasmodial and are medicinally important. The whole plant is very bitter and has abortifacient, alterative, anthelmintic, antiperiodic, emmenagogue and purgative properties. These properties may help in further research for developing a novel herb based medicine against various diseases. The present review is an attempt to provide basic information about this medicinal herb.

Keywords: *Aristolochia bracteolata*, purgative, antipyretic, anti-inflammatory agents and traditional medicine

1. Introduction

Medicinal plants occupy a distinct place in the life of human, right from the primitive till today. Use of plants as a source of medicine has been inherited and is an important component of health care system in India. India has more than 3000 years of medicinal heritage based on medicinal plants. Medicinal plants are widely used by all sections of the population either directly as folk remedies or indirectly in the preparation of modern pharmaceuticals. India is endowed with a rich wealth of medicinal plants, microbes are closely associated with the health and welfare of human beings. Some are beneficial and some are detrimental. Plants produce a diverse extent of bioactive molecules, making them wealthy source of various types of medications. Most of the drugs today are obtained from natural sources or semi synthetic derivatives of natural products and used in the traditional systems of medicine (Sukanya *et al.*, 2009) [23].

Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables, and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Medicinal plants play a vital role in preventing various diseases. The antidiuretic, anti-inflammatory, anti-analgesic, anticancer, antiviral, antimalarial, antibacterial, and antifungal activities of the medicinal plants are due to the presence of the above-mentioned secondary metabolites. Medicinal plants are used for discovering and screening of the phytochemical constituents which are very much helpful for the manufacturing of new drugs. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates, and chemical entities for synthetic drugs (Tiwari *et al.*, 2011) [24].

A larger part of the total population in developing countries still uses traditional folk medicine obtained from plant resources (Srivastava *et al.*, 1996) [22]. About 80 percentage of individuals from developed countries use traditional medicine which has compounds derived from medicinal plants. In the last few years, a number of reported have been conducted in various countries to manifest such ability. Numerous plants have been used because of their antimicrobial traits, which are chiefly synthesized during secondary metabolism of the plant. Therefore, such plants should be examined to better understand their activities, trustworthy and efficiency (Prusti *et al.*, 2008) [17].

Aristolochia is a large plant genus with over 500 species, belongs to the family *Aristolochiaceae*. In the indigenous system of medicine, the plant was used for the treatment of skin diseases, inflammation and purgative. Root extract was accounted to have anti-bacterial activity. *Aristolochia* species has been used extensively in the traditional

Chinese medicine. Its diverse biological functions include hypertension relief, leukocyte enhancement, rheumatism relief, edema therapy, as well as analgesic and diuretic effects. It is a perennial climber shrub with woody base stocks. Leaves simple, alternate, entire, with undulate margins, acute; flowers greenish white, in auxiliary cymes; fruits rounded oblong, 6 chambered contain numerous winged compressed seeds (Sawarkar *et al.*, 2011) [21].

Aristolochia bracteolata is a herbaceous perennial medicinal plant with cordate leaves and dark purple colour tubular flowers belonging to the family Aristolochiaceae. The plant commonly called as Worm killer in English and Aadutheendapalai in Tamil, due to supposed anthelmintic activity and trypanocidal effect (Samia *et al.*, 2006) [20]. It has been reported to be distributed throughout the South India, Bengal, Upper Gangetic Plain, Ceylon and Tropical Africa. Traditionally, *Aristolochia bracteolata* has been reported to be used for inflammatory diseases, fever and insect bites. The whole plant was used as purgative, anthelmintic, antipyretic, anti-inflammatory agents. The plant contain Aristolochic acid has many medicinal properties in various disease conditions (Kirtikar and Basu, 1935) [13].

Scientific classification

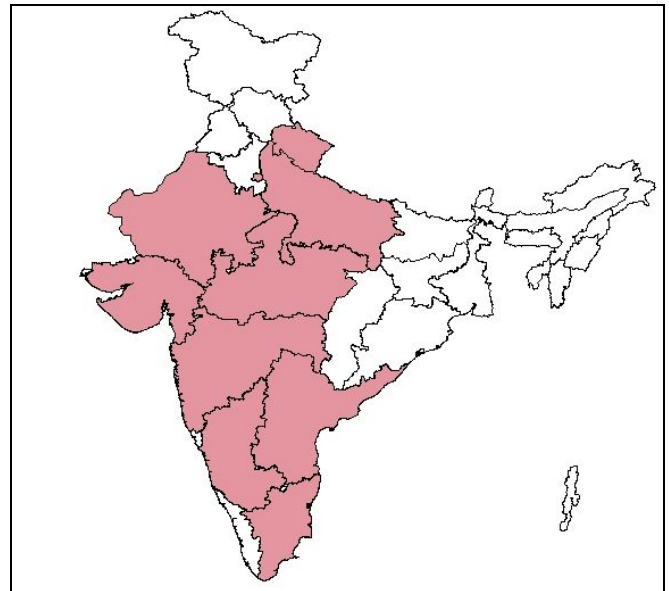
Kingdom	: Plantae
Phylum	: Tracheophyta
Class	: Magnoliopsida
Order	: Piperales
Family	: Aristolochiaceae
Subfamily	: Aristolochioideae
Genus	: <i>Aristolochia</i>
Species	: <i>A. bracteolata</i>
Binomial name	: <i>Aristolochia bracteolata</i>

Vernacular names

Language (No. of Names)	Vernacular Name
Hindi (5)	aulosa, hukka-bel, kalipaad, kiramar, kitamar
Kannada (13)	aadumuttada gida, kalaguraki, kathhe hotte kirubana baeru, kathhe kirubana baeru, kathhegaalina hambu, kathhegarida, kathhekirubana gida, kaththe kirubana gida, katthe hotte gida, katthe kaalambu, katthe kirubana gida, keeta maari gida, kuri gida
Malayalam (2)	attukottappala, atutinnappala
Marathi (3)	gandhaari, gindhaan, keedamaari
Sanskrit (2)	kitamari, visanika
Tamil (4)	aadutheendapalai, aduthinnappalai, atutinnappalai-vittu, atutinnappalai
Telugu (7)	gaadide gadapara, gadaparaku, gadida-gadapaku, gadide, gadidhagadapaaku, kadapara, thella esshvari

Geographical distribution

This species is globally distributed in Tropical Africa, Arabia, Sri Lanka, Pakistan and India. Within India, it is found in northern and central India from Haryana to West Bengal and southwards to Tamil Nadu and Kerala. It is common in dry areas, particularly on black cotton soil, usually growing as a weed.



Geo-Distribution Map for *Aristolochia bracteolata* LAM (Source: MOEF, GOI.)

Botanical description

Aristolochia is a genus of evergreen and deciduous woody vines and herbaceous perennials. The climbers reach heights of 10 to 50 centimetres. The smooth stem is erect or somewhat twining. The simple leaves are alternate and cordate, membranous, entire and petiolate, growing on leaf stalks. There are no stipules. The flowers grow in the leaf axils. They are inflated and globose at the base, continuing as a long perianth tube, ending in a tongue-shaped, brightly colored lobe. There is no corolla. The calyx is one to three whorled, and three to six toothed. The sepals are united (gamosepalous). There are six to 40 stamens in one whorl. They are united with the style, forming a gynostemium. The ovary is inferior and is four to six locular. These flowers have a specialized pollination mechanism. The plants are aromatic and their strong scent attracts insects. The inner part of the perianth tube is covered with hairs, acting as a fly-trap. These hairs then wither to release the fly, covered with pollen. The fruit is dehiscent capsule with many endospermic seeds. Capsule 2-3 cm long, 12-ribbed, glabrous. Seeds may, 5-7 mm long, flat and dark coloured.

Cultivation

It can be propagated by seeds which germinate in about two weeks. Seeds can be collected by bagging the fruits. The seeds are sown in June in well mannered beds. Seedlings are transplanted after six weeks and trained on to bamboo platforms. The vines flower in September and fruit during February - March. They are allowed to grow for two years to yield roots of marketable size. The yield of roots is estimated at 4500-5600 kg/ha from two year old vines. The roots are collected in the autumn. The adhering earth is removed by minimum washing. The roots are dried in the sun or by gentle heat (Wink and Schimmer, 2012) [25].

Chemical constituents

Methanolic extract of plant parts of *A. bracteolata* was the source of physiological active compounds. The secondary metabolites from *Aristolochia* species cover 16 major groups classified by their chemical structures, including aristolochic acids and esters, aristolactams, aporphines, protoberberines,

isoquinolines, benzyloisoquinolines, amides, lignans, biphenyl ethers, coumarins, tetralones, terpenoids, benzenoids and others. The Phytochemical analysis of this plant has revealed the presence of alkaloids, triterpenoids, steroids, sterols, flavonoids, tannins, phenolic compounds and cardio glycosides (Devesh and Alka, 2014) [8].

Considerable amounts of reducing sugars in free form are present in the roots. The chief active principle of the drug is aristolochic acid, though aristolic and p-coumaric acids also appear to contribute to the activities of the drug. Aristolochic acid is 8-methoxy-3; 4-methylenedioxy – 10 – nitrophenanthrene – 1 – carboxylic acid. It is intensely bitter and is optically inactive. It is the same as isoaristolochic acid, aristolochia yellow, aristinic and aristolochic acids, but is different from aristolochine now identified as 1-curine. The aristolochic acids were host of phenanthrene derived metabolites in which the aristolactams also possessed the similar skeleton.

Table 1: Bioactivity of the crude extracts of the *Aristolochia bracteolata*

Source	Parts	Bioactivity	Reference
<i>Aristolochia bracteolata</i>	Whole plant	Antiplasmodial	Ahmed <i>et al</i> (2010) [1, 10]
		Antiallergic	Chitme <i>et al.</i> (2010) [6]
	Leaves	Antifeedant	Elango <i>et al.</i> (2011) [9]

Medicinal uses

Decoction of the whole plant is given in fever, worms, skin disease and snake bite (Alagesaboopathi, 2009) [2, 3]. The plant is used in traditional medicine as a gastric stimulant and in the treatment of cancer, lung inflammation, dysentery and snake

bites (Negi *et al.*, 2003) [16], antimicrobial activity (Manikandar *et al.*, 2006) [14] anti-arthritis activity (Havagiray *et al.*, 2009) [11], anti-allergic activity (Chitme *et al.*, 2010) [6] and anti-oxident property (Kalpana devi *et al.*, 2011) [12]. The ethyl acetate, acetone and methanol extraction of roots showed promising antibacterial activity in Gram positive and Gram negative bacterial dish. Among there ethyl acetate extract was found to be the most effective (Negi *et al.*, 2003) [16].

An infusion of the dried leaves, sometimes with the dried root added, is used in Nigeria by Hausa and Fulani as anthelmintic, a use that is also known in India. The freshly bruised leaves are mixed with castol-oil and used in Nigeria topically on pimples. In India the plant is used to treat scabies, and in the Ogaden of Ethiopia on leg itch. The root is bitter. Roots mixed with lime juice are taken for snake bite and scorpion stings in Nigeria. East of Lake Chad also the root is applied to scorpion stings. The flowers are sometimes worn in Northern Nigeria as charm against snake-bite and scorpion-stings (Burkill, 1985) [5]. The use of the plant as antibiotics, antimalarial and aphrodisiac has been reported by traditional healers of Southwestern Nigeria. Negi *et al.* (2003) [16] reported that it is used as a gastric stimulant and in the management and treatment of cancer, lung inflammation and dysentery.

It should be used with great caution since the plant can be toxic to mammals.

The stem and the root contain the alkaloid aristolochic acid. The dried, powdered root has been shown to increase the contractions of the uterus during labour. It has been used as a substitute for ergot. The leaves and roots are used to rid the body of Guinea worm (a parasitic infection caused by a nematode)

Table 2: Ethnomedical uses of different parts of *A. Bracteolata*

Whole plant	Dermatitis, allergic disorder, leprosy, jaundice (Ratna manjula <i>et al.</i> , 2011) [18] Worms, fever (Alagesaboopathi, 2009) [2, 3] Mosquito repellent (Zarroug <i>et al.</i> , 1988) [26] Anodyne, purgative, emmenagogue (Chopra <i>et al.</i> , 1956) [7]
Leaves	Anti-inflammatory dermatitis, rashes skin disease, for scorpion sting (Alagesaboopathi, 2009) [2, 3] Antipyretic, snake bite (Alagesaboopathi, 2011) [4] Antiulcer, amenorrhoea, antihelmintic (Roy <i>et al.</i> , 2009) Antiplasmodial (El-Hadi <i>et al.</i> , 2010) [19]
Seeds	Antibacterial, anti-inflammatory and analgesics, may toxic to goats (Nair and Narayanan, 1961) [15]
Roots	Syphilis, gonorrhoea & skin diseases, eczema (Roy <i>et al.</i> , 2009) [19]

Conclusion

From the study it was concluded that *Aristolochia bracteolata* having many functions in human health and phytochemical constituents. This review will help researchers and scientists in locating the detailed information on *Aristolochia bracteolata* and address the Clinical significance of these plants that can be evolved by studying their active phytoconstituents, toxicity studies and further mechanistic studies are to be assessed and explored.

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