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Arisaema jacquemontii Blume (Araceae): A review of medicinal uses, phytochemistry and pharmacology

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Abstract

Arisaema jacquemontii Blume (Araceae) is a medicinally important plant and is used for the treatment of different diseases specially in dermatological disorders. Alkaloids, phenols, terpenes, flavonoids, glycosides, tannins have been reported from this plant. Antioxidant, antifungal, antibacterial and anticancer activities are also shown by *Arisaema jacquemontii*. The present review is an attempt to compile all the previous data on the basis of its medicinal uses, phytochemistry and pharmacology reported in the previous articles.

Keywords: *Arisaema jacquemontii*, medicinal uses, phytochemistry, pharmacology

1. Introduction

Arisaema jacquemontii Blume belongs to family Araceae. It is a perennial tuberous herb with variable height from 4-28 inches. It is native to Afghanistan, China, India, Kashmir, Nepal, Pakistan and Sikkim. It is easily available in Himalayan forests above the sea level of 2300-4300 m^[1] and also found in upper forest and lower alpine zone in the drier areas of Himalayas in the range of 2400-4000 meters^[2]. The species name refers to French naturalist Victor Jacquemont (1801-1832)^[3]. Flowering period is June-July and fruits are red berries when mature. Plant has 1 or 2 leaves, leaflets 5-7, elliptic-ovate or elliptic – lanceolate. Spathe is green, white-streaked^[4]. Its habitat is soil full of humus and rocky substrates, shrubberies and sub-alpine areas^[5], prefers a loamy or peaty soil and will tolerate a sunny position if the soil is moist but not water-logged and the position is not too hot or exposed. *Arisaema jacquemontii* plant is typically male when small, and female or hermaphroditic when large, with a single plant capable of changing sex depending on its nutrition and genetics and perhaps changing sex several times during its long life^[1].



Arisaema jacquemontii Blume.

Table 1: Scientific classification^[1, 4, 6, 7].

Kingdom	Plantae
Phylum	Magnoliophyta or Tracheophyta
Class	Angiospermae or Liliopsida
Order	Alismatales or Arales
Family	Araceae
Genus	<i>Arisaema</i>
Species	<i>Jacquemontii</i>
Synonyms	<i>Arisaema brevispathum</i> Buchet; <i>Arisaema cornutum</i> Schott; <i>Arisaema cylindraceum</i> Wall.ex. Engl.; <i>Arisaema exile</i> Schott; <i>Arisaema wightii</i> Schott.

Table 2: Names of *Arisaema jacquemontii* Blume., in different languages and regions.

Regions / languages	Names
Bhutan (Dagala)	Dav-ba ^[8]
China	Zang nan lü nan xing ^[9]
English	Cobra lily, Jack in the Pulpit, Sheathed green dragon ^[7] , Cobra plant, Snake lily, Green ^[10] , Jacquemont's Cobra lily ^[6] , Cobra plant, Snake lily ^[11] .
India	Basair, Haput, Gogej, Jinjok, Khaprya, Ki kukri, Kirala, Saperi mausi ^[7] , Hapat Makai ^[12] , Meen ^[13] , Kirala, Sarap ^[14] , Bankh ^[15] , Khaprya, Saperi mausi ^[16] , Khyan bank, Sarpabheda ^[17] .
Ladakh and Kashmir	Surp, Hapat-Brand ^[10, 18, 19]
Nepal	Timju ^[11] .
Pakistan	Sap ki booti ^[2] , Hathphees ^[20] , Wara Marjarai, Zahur Butay ^[21, 22] Marjarai ^[23, 24] , Sapmak ^[25] .
Tibet	Dahpa ^[11] .

Table 3: Taxonomy^[4, 5, 10]

Characters	<i>Arisaema jacquemontii</i> Blume.
Habitat	Perennial herb, moderately moist and shady places, soil full of humus and rocky substrates, shrubberies, sub-alpine area.
Spathes	Green, white-streaked with long up curved green or purple tail like tip, as long as or longer than the foliage, tube cylindrical, 3.7-5.5 cm long; limb curved, oblong to oblong-ovate, slightly shorter than the tube, tail 4-8 cm.
Seeds	3-8, subglobose, up to 2.5 mm broad, reddish brown, acutish at one end.
Leaves	Leaves 1 or 2. Leaflets 5-7, elliptic-ovate or elliptic-lanceolate, 4.5-13.5 x 2-4 cm, caudate-subacuminate, subsessile, cuneate, subentire, wavy to crenulate; petiole up to 22 cm long. Leaf digitate with 5-9 narrow or long pointed leaves.
Flowers	Male flowers: stamens stipitate, anthers subglobose, c. 1 mm broad, dehiscing by longitudinal slits or by an apical pore. Female flowers: ovary subglobose, 1.5-2 mm long, style subsessile, stigma disciform. Flowering during June-July.

Economic Importance

In Nepal leaves are used as vegetable^[11]. Dried tuber is also used as food. Plant is widely used in horticultural trade^[1, 6]. It is also used in preparation of some food dishes and alcoholic beverages^[17].

Toxicity

The plant of *Arisaema jacquemontii* contains calcium oxalate crystals which causes an extremely unpleasant sensation similar to needles stuck into mouth and tongue if they are eaten but are easily neutralized by thoroughly drying or cooking the plant or by steeping it in water^[1, 2].

Ethnopharmacognosy

Arisaema jacquemontii is a medicinally important plant. It is used in different countries to treat various ailments. Mostly it is used for dermatological purposes.

Whole Plant

In Shopian district of Kashmir plant is used against skin problems^[26], used camouflage for snakes in coniferous temperate zone of Kaghan valley^[27], also used against snake bites in Manzaray valley, Malakand agency, Pakistan^[28]. In Bhutan (Dagala) it is used to alleviate microbial infection, swelling, malignant growth of tissues and bones, throat infection, obstruction, infertility and uterus diseases^[8].

Bulb

The water extract of the bulbs is used to get rid of skin eruptions and is recommended for the treatment of skin infections caused due to cold temperature by the people of Kashmir and Himalaya region^[5, 10]. It is also considered anti-convulsant in folk medicine^[29].

Flower

In Tibetan therapy flower is used against fever, stomach problems, swelling, toothache, scabies, chest infection, uterus and menstrual disorders and throat problems^[11].

Fruits

Fruits and its decoction are used as antidote against poisonous mushrooms and snake bite. It is also used for cough, kidney

and skin diseases in Garhwal Himalaya^[16, 30]. They are poisonous and cause sedation, very small quantity is used during meal for relieving body pain. It is also used in small quantities in various preparations by "Hakims" for psychic and nervous disorders^[23, 31].

Rhizome

Rhizome bolus is given orally to livestock for respiratory problems in Swat^[32], rhizome is ground with edible oil to form a paste, which is used for massage purposes in order to regain the muscular strength and in skin problems such as blisters, pimples by people of Uri Kashmir^[12, 33, 34]. In Tibetan therapy it is used against fever, stomach problems, swelling, toothache, scabies, chest infection, uterus and menstrual disorders and throat problems^[11]. In Northern areas of Pakistan, 1 to 2 g dried powder of rhizome is used on infected site of snake bite^[21]. It is poisonous and cause sedation, very small quantity is used during meal for relieving body pain. It is also used in small quantities in various preparations by "Hakims" for psychic and nervous disorders^[23, 31]. In Uttarakhand state it is used for snake bites^[35]. Rhizome poultice is applied on rheumatic pain and it is poisonous^[36].

Root

Purified root powder is taken in worm infestations^[17], paste of crushed dried root powder mixed with ghee or oil is applied externally to treat boils in Baramulla and Kupwara^[37]. In Tibetan therapy it is used against fever, stomach problems, swelling, toothache, scabies, chest infection, uterus and menstrual disorders and throat problems^[11].

Tuber

Tubers are given to sheep as a remedy for colic and also as wormicide in North West of Himalaya^[14]. The tuber of plant is used as antidote to poisonous mushrooms and snake bite and also for cough, kidney and skin diseases in Garhwal Himalaya^[30]. Chopped tuber is used for chronic boils^[5], cough, kidney and skin diseases in Kedarnath western Himalaya^[13]. The local people of Tons Watershed Uttarkashi uses tuber for snake bite and skin problems^[15]. Tuber of the plant is used as an antiseptic on ruptured wounds^[18]. The 2-3

tubers are made into paste mixed with human saliva and applied on painful burns or boils, with beneficent results in blisters, pimples in Ganderbal Jammu and Kashmir^[38]. Tuber is used for cough and respiratory tract infection in cows and buffaloes in Shawar valley Swat, Pakistan^[24]. The tubers are chopped and then poultice formed is used on chronic boils as

a remedy in Kashmir Himalaya, India^[10]. Tuber and tuber juice is used for ringworm and in skin diseases by the people of Kumaun and Garhwal Himalaya region^[1, 39]. Juices from tuber are applied to skin in treatment of ring worm and other skin diseases, from the corms used in infection and respiratory disorders^[7].

Table 4: Phytochemistry

Part (extract)	Compounds
Fruits (methanol or chloroform)	Terpenes, saponins and glycosides ^[29] .
Leaves (methanol)	Glycosides, terpenoids, coumarins, quinines, saponins, tannins, alkaloids, anthraquinones, flavonoids and phenols ^[40] .
Plant (chloroform)	Triterpenoid 2- hydroxyl diplopterol ^[2] .
Plant (methanol)	Arisaeminone ^[39]
Roots (methanol)	Phenol, flavonoid ^[25] , terpenes, saponins, glycosides ^[29] , triterpenoids 30-nor-lanost-5- ene-3beta-ol and 30-nor-lanost-5-ene-3-one ^[41] .
Roots (chloroform)	
Shoots (methanol or chloroform)	Terpenes, saponins and glycosides ^[29] .
Tubers	Amino acids i.e Alanine, arginine, aspartic acid, leucine, lycine, serine, theonine, tyrosine, valine ^[39] .
Seeds	13-phenyltridecanoic acid ^[39] .

Table 5: Pharmacology

Part (extract)	Pharmacological activity
Fruits (methanol)	Increase in cell oxidative burst response ^[29] .
Herb	Ariseminone-anticancerous compound ^[1] .
Leaves (methanol or hexane)	Ferric reducing antioxidant power (FRAP) activity, Immune modulating potential ^[40] .
Plant (methanol)	Activity in Rad 6 and Rad 52 yeast assays ^[29] .
Roots (methanol)	Antioxidant, antifungal and antibacterial ^[25] .
Roots (methanol or chloroform)	Immunomodulatory and antileishmanial activity ^[29] .
Roots (chloroform)	Anticonvulsant ^[41] .
Shoots (methanol)	Phytotoxic activity, increase in cell oxidative burst response ^[29] .
Tuber (methanol)	Antimalarial ^[42] .
Tuber (crude extract)	Anti-insect and anti-cancer ^[43] .

Conclusion

The traditional uses, economical importance, toxicity, pharmacology and phytochemistry of *Arisaema jacquemontii* Blume presented in this review could be helpful for future studies and research and new molecules could be discovered from this plant for life threatening diseases like cancer. The plant has good future prospective for discovery of new molecules and pharmacological activities.

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