

**PHARMACOGNOSY AND CLASSICAL USES OF ARJUNA
(*TERMINALIA ARJUNA* ROXB.): A CRITICAL REVIEW**

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ABSTRACT

Ayurveda is the oldest system of medicine with a consistent theoretical basis and clinical applications. The strength of *Ayurveda* lies in its broad, all-encompassing view of the dynamic interrelationship between organic physiological processes, external factors including climate, life style and diet along with internal emotional stages. In contrast, modern science takes a more particular view based upon specific molecular structure and chemistry. *Ayurveda*, with its concept of *Tridosha* theory, is capable to provide a complete understanding of health in terms of a metabolic balance between the *vata*, *pitta* and *kapha*. Arjuna viz. *Terminalia arjuna Roxb.* of Combretaceae family is a close relative of *Haritiki* and *Vibhitaki* and has a similar importance in Ayurvedic medicine as a cardiogenic and rejuvenative agent for heart. Its action is specific for the heart and is useful in all types of heart diseases. Now a days when heart diseases are progressive among developed and

developing countries with increasing death rate, Arjuna is an important herb and can be taken as a general cardiogenic for those with a propensity to myocardial infarction.

KEY WORDS: Tridosha, Terminalia arjuna Roxb., Heart diseases, Myocardial infarction.

INTRODUCTION

An ideal drug should be available in abundance in nature and Arjuna botanically known as Terminalia arjuna Roxb., belonging to combretaceae family fulfills the criteria. Though

Acharya Charak had described this plant under *udard-prashman*.^[1] (effective in urticaria) and *kashaya skandh*.^[2] *dravya* and not under *hridya-gana*.^[3] (effective for heart) but *Chakrapani datta* and *Bhavamishra* had mentioned it effective for heart problem.^[4] Its action is specific for the heart and is useful in all types of heart diseases, promoting heart function and adding in longevity. It helps in the recovery after heart attacks as well as in their prevention. It promotes healing of the soft tissue and of internal organs and is specific for treating broken bones.

MATERIAL AND METHODS

In these days when heart diseases are the main cause of death, stem bark of Arjuna can be taken as a general heart tonic for those with a propensity to heart attacks. This drug is widely used in *Ayurveda* and different pharmaceutical firms manufacture a number of patent preparations of it. It is one of the important ingredients of some *Ayurvedic* formulations like *Arjunarishta*, *Arjun-ghrita*, *Arvindasava*, *Arjun ksheer-pak* and *Lakshadi guggulu* etc. As the bark contains a good amount of tannins, it has been used for tanning.

Taxonomy

According to Bentham & hooker 1862 -

Kingdom-Phanerogams

Class- Dicotyledones

Sub-class- Polypetalae

Series- Disciflorae

Order- Myrtales

Family- Combretaceae

Genus- Terminalia

Species- arjuna^[6]

Vernacular names

Arjuna is commonly known as *indrada*, *kakubha*, *devshal*, *dhaval*, *nadisarja*, *madhu gandhi prashunak*, *veer vraksha*, *swashneshwar*, *swetavaha*, *sarpana* and *hrid rog veri* in Sanskrit.^[7] *Orjun* on Assamese, *orjun* and *arjun* in Bengali, *sadado* in Gujrati, *koha* and *kahua* in Hindi, *maddi* in kannad, *sanmadat* & *iadada* in Marathi, *vellamaruta* and *pulla-masuta* in Malayalam, *arjuno* and *hanhal* in Oriya, *arjan* and *jurma* in punjabi, *vellamatta* and *marutai* in Tamil, *Maddhi* in Telugu, *topukkan* in Burmese, *kumbuk* in singhalese and arjuna in English.^[8]

It is a tree which grows in vicinity of water streams (*Nadi-sarja*) and has spreading branches (*Kakubha, Sarpan*). It has white outer bark (*Dhavala, Swetavaha*) and flowers with honey like aroma (*Madhu gandhi prasunaka*). It is a potent drug (*Indradu, Veervraksha*) useful in cardiac disorders (*Arjuna, Hrid rog varri*) and dyspnea (*Swasanesvara*).^[9]

Classical References

Acharya charaka had mentioned Arjuna under *Kusthaghna lepa*.^[1], *Uddarda-prashman gana*.^[11], *sarasava*.^[12], *kashayay skandha*.^[13], *prameha chikitsa*.^[14], *vishaghna yoga* for keeta and *loota visha*.^[15] *vrana aachadan*.^[16], *kaphaj hrid rog*.^[17], *mahaneel tail*.^[18] and in *pushyanoog churna*.^[19].

Acharya sushruta had described Arjuna in bleeding *vrana*.^[20], *salsaradi gana*.^[21], *sukra dosha*.^[22], *restoration of normal skin colour of the scar*.^[23], *for healing of wound*.^[24], *paittik vriddi*.^[25], *neeli tail*.^[26], *ksharagada*.^[27], *raktabhishyand*.^[28], *jirna jwar*.^[29], *atisar*.^[30] and *specially flower for the formation of gayatriyadhavaleha used in raktapitta*.^[31]

Plant description

It is a large, deciduous tree, 20-25m.high, with a spreading crown and drooping branches, leaves sub elliptic, with 1-2 gland at base, oblong-elliptic, coracaceous, usually 10-15cm. long, occasionally 25cm. cordate, shortly acute or obtuse at the apex, flowers yellowish-white, on solitary penicled-spikes. Fruits obovoid-oblong with thick narrow wings, striation curving much above.^[32]

Flowering- April-May.

Fruiting - Cold season.^[33]

Habitat

The tree is common throughout the maximum part of the Indian peninsula along rivers, streams, ravines and dry water courses. It is plentiful in Tirunelveli and on the west coast. It extends northwards to the sub- Himalayan tract. It is a cultivated tree in Punjab and common in chota nagpur, Orissa etc. It is extensively planted in India for shade and ornament in avenues or parks, even in hot and dry regions.^[34]

Parts used

Bark, leaves, fruits.^[35] and also flowers by *susruta*.

Dose

Bark powder 1-3gm., decoction 23-46ml., ksheerpak 6-12gm.^[36]

Macroscopic characters

- A) Bark-** Externally pale in colour, flesh colored internally, and smooth, flaky, astringent in taste.
- B) Leaves-** Opposite, short petioled, glabrous beneath, oblong or elliptic in old trees, two glands on mid rib beneath, near the base. Leaf is slightly astringent and mucilaginous.
- C) Fruits-** With 5 sub equal acute wings marked with much ascending striations.

Microscopic features- Leaves are dorsiventral, single layered, cuticularised. Upper and lower epidermis bear unicellular glandular and non glandular trichomes and the lower epidermis are provided with ranunculaceous stomata. In the mid rib region, inside the epidermis several layers of thick walled collenchymatous and thin walled parenchymatous tissue surround the central vascular cylinders. Vascular bundle is open, bicollateral i.e., xylem surrounded by phloem. Few secretory canals are observed in the parenchymatous tissue and in the central region. Abundant cluster crystals of calcium oxalate are noted in the phloem and parenchymatous tissues. Mesophyll is composed of palisade and spongy cells. Palisade is double layered. Stomatal index is 14-15.5; vein islet numbers are 11-19 per sq.mm and palisade ratio varies from 7-12.

Stem bark – The young stem shows typical combretaceous type of hair having swollen base and tapering apex. Transverse section of the bark shows cork, thin walled parenchymatous ground tissue with embedded crystal of calcium oxalate and secondary phloem with patches of sclerenchyma fibers, mucilage secreting ducts, sclerenchyma of fibers and tanniferous cells. Mature bark shows a broad zone of phloem consisting of ceratanchyma, phloem parenchyma, phloem fibers and crystal fibers.

Fruits- Transverse section shows epidermis and hypodermis. Secretory canals, duct and vascular supply are present. The seeds are composed of stone cells, fibers and vascular supply.^[37]

Identification of Arjuna

Leaves opposite, short petioled with two glands on mid rib beneath near the base. Bark pale externally, flesh colored internally and flaky. Fruits with 5 sub- equal acute winged, marked with much ascending striations. Microscopically leaves show dorsi-ventral structure with ranunculaceous stomata on the lower surface. Vascular bundle is open, bicollateral and palisade is double layered. Abundant cluster crystals of calcium oxalate are present. Bark consists of thin cork, thin walled parenchyma in which rosette crystals are embedded. Fibers, mucilage secreting ducts and tanniferous cells are present. Starch, alkaloid, tannin, saponin, sugar, oleoresin, mucilage are present.^[38]

Commonly used adulterants of Arjuna

Dried bark of Terminalia exhibit a very great variability of forms. There are as many as 14 different varieties. The bark of these varieties is so very similar in appearance that there is very great likelihood of their being mistaken for one another. In market, all of them are being sold indiscriminately as 'Arjuna' as drug sellers can't distinguish between these varieties. The species besides Terminalia arjuna available are Terminalia bialata steud., Terminalia belerica Roxb.; T. alata Heyne ex roth.; T. manni King.; T. myriocarpa Heureka & Muell-Arg.; T. chebula Retz.; T. catappa Linn.; T. purifolia Kurz.; T. travancorensis Wight & Arn.; T. pallida Brandis.; T. citrina Roxb. ex Flem.; T. paniculata Roth.^[39] In the market, the barks of both Terminalia arjuna and T. alata are sold under the name of Arjuna.

Phytochemical composition

The bark of Arjuna contains sugar, tannin, coloring matter, a glycosides substance, and carbonates of calcium, sodium and traces of chlorides of alkali metals. The total tannin content amounted to 12 % and the ash to 30 %. The bark was found to contain an unusually large quantity of calcium salts, about 12% of tannins, an organic acid with a high melting point, a phytosterol, an organic ester and some coloring matters.^[40] Dutta and co-workers 1935 have isolated arjunin an aglucon glycoside, a red amorphous coloring matter, arjunctine and reducing sugar. These active principles in small doses stimulates the force of contraction of frog's heart (in situ).^[41] Further investigation on bark showed the presence of sitosterol, ellagic acid and a new tri hydroxy. triterpene monocarboxylic acid named arjunic acid.^[42] The fruits contain 7-20% tannin, arjunic acid, mannitol, tannin and a considerable amount of potassium chloride. The leaves contain on dry basis protein 10.10%, crude fiber 7.78%, reducing sugar 4.30%, total sugar 5.57%, starch 11.09% and mineral 7.09%.^[43]

Organoleptic characters

Colour – Colour of the outer side as well as inner side of the bark is identical and grayish-brown.

Odour – none

Taste – astringent

Size – the pieces of various size, about 15x10x1cm.

Shape – flats

Fracture – short.^[44]

Propagation

by seeds.^[45]

Pharmacological properties^[46]

Guna: Laghu, ruksha

Rasa: kashaya

Vipaka: Katu

Veerya: Sheeta

Dosha karma: Kapha-pitta shamak

Prabhava: Hridya

RESULTS AND DISCUSSION**Classical indication**

some of the important classical indication of arjuna are as follows-

- 1- Powdered arjuna bark impregnated with juice of *Adhatoda vasica* several times should be taken with *ghee*, honey and sugar candy. It alleviates tubercular cough and intrinsic haemorrhage.^[47]
- 2- Decoction of Arjuna and *Santalum album* is useful in spermatorrhoea.^[48]
- 3- The paste of Arjuna bark mixed with honey should be applied in freckles, after blood letting.^[49]
- 4- In cardiac disorders milk processed with Arjuna bark should be used.^[50]
- 5- Those who take Arjuna bark with *ghee*, milk, or *jaggery*-water are relieved of heart diseases, chronic fever, intrinsic hemorrhage and attain longevity.^[51]
- 6- One who takes powder of wheat and Arjuna bark cooked with oil, *ghee* and *jaggery* with milk overcomes all the cardiac disorders.^[52]

- 7- For healing of fractured bone one should take bark of Arjuna and wheat powder with milk and ghee.^[53]
- 8- Powder of Arjuna bark and *laksha*(*Laccifer lacca*) mixed with *guggullu* and pounded with *ghee* promotes union in fracture.^[54]
- 9- Decoction of *vasa*, *arjuna*, *yavasa* and *nimb* should be used as tub-bath in case of haemorrhoides.^[55]
- 10- The leaves of *kadamba*, *arjuna*, *nimb*, *pippala* and *arka* are useful for covering the wound.^[56]
- 11- In diarrhea associated with blood, *Arjuna* bark mixed with honey should be taken with milk; to check haemorrhage.^[57]
- 12- The cold infusion of the bark of *jambu*, *amra* and *arjuna* checks intrinsic haemorrhage.^[58]
- 13- Lepa of *padhya*, *utpal mrinal*, *sarja*, *arjuna vetas* and *mulethi* is useful in *paittik updansa*.^[59]

CONCLUSION

Arjuna is an important plant available in abundance in our country. *Acharya Charak* has described its use for *kaphaj* cardiac disorders, modern researches has revealed its hypo-lipidemic and cardio-protective action. In the present paper author has tried to explore different vernacular name, pharmacognostical, phytochemical characteristics and classical indication of the plant. One should consume regularly *Arjun twak ksheer-pak* to prevent myocardial infarction.

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