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REVIEW ARTICLE

Review on Ethnobotanical Importance of *Saraca indica*

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ABSTRACT

Plant materials have been used for the treatment of serious diseases throughout the world before the advent of modern clinical drugs. In many journals, national and international, we find an increasing number of research publications based on herbal drugs. Ashoka is one of the most legendary and sacred trees of India. Ashoka tree, universally known by its binomial Latin name Saraca indica belonging family Fabaceae. It is used as spasmogenic, oxytocic, uterotonic, anti-bacterial, anti-implantation, anti-tumour, anti-progestational, anti- estrogenic activity against menorrhagia and anti-cancer. This review contains the phytochemical constituent and different reported pharmacological activity.

KEYWORDS

Vernacular names, Phyto-chemical study, Pharmacological activities, Pharmacognostic features, Botanical description

INTRODUCTION

Herbal medicines are the oldest remedies known to mankind. In the present scenario, the demand for herbal products is growing exponentially throughout the world and major pharmaceutical companies are currently conducting extensive research on plant materials for their potential medicinal value. Plant material have been used for the treatment of serious diseases throughout the world before the advent of modern clinical drugs.[1]

Saraca indica is an important indigenous plant with lots of traditional importance belonging to the family fabaceae. It is the wonderful herb that claims to cure several diseases according to ayurvedic medicine. It mainly contains glycosides, tannin, saponin, flavonoids, and sterol.[2]

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In Ayurveda, the bark is used in dyspepsia, fever, dipsia, burning sensation, visceromegaly, colic, ulcers, menorrhagia, metropathy leucorrhoea and pimples.[2]

Saraca indica possesses various activities such as analgesic, antipyretic, fungitoxic, anthelmintic, antidiabetic, larvicidal activity, antimicrobial activity, CNS depressant activity, antiulcer activity, anti-inflammatory activity etc. This review contains pharmacognostic study of various parts of plant, phytochemical constituents and pharmacological activities of various parts of plant.[3]

Scientific Classification[4]

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Mgnoliopsida
Order	:	Fabales
Family	:	Fabaceae
Genus	:	Saraca
Species	:	indica

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Figure 1: Ashoka plant[5]

Figure 2: Ashoka plant with fruits & leaves[6]

Figure 3: Bark of Ashoka[7]

Figure 4: Flower of Ashoka[8]

Vernacular Name

This tree has a multitude of names in indian literature. Some names for the Ashoka tree include:

Latin name: Saraca indica
Common name: Asoka, Hempushpa
English name: Asoka

In Sanskrit: Sita-Ashoka, Anganapriya, Ashopalava, Ashoka, Asupala, Apashaka, Ashoka

Other languages: Vanjulam (Hindi), Ashok (Assamese), Oshok (Bengali), Ashoka (Oriya), Asogam (Tamil), Asokam (Malayalam), Asokamu (Telugu), Sokanam (Thai), Kenkalimara, (Kannada), Tengalan (Malay).[9]

Natural Habitat

It is distributed in evergreen forests of India up to an elevation of about 750 meters. It is found throughout India. Specially in Himalaya, Kerala, Bengal and whole south region. In Himalaya it is found at Khasi, Garo and Lussi hills and in Kerala region.[10]

Botanical Description

Morphology

Ashoka plant is perennial & it is woody throughout. Its stems are erect or ascending, greater than 2 m tall, solid, glabrous or sparsely glabrate. Its leaf or leaflet's margins entire, opposite, 10-many, petiolate, compound, even pinnate, glabrous or nearly so, coriaceous. Its stipules are conspicuous, green, and triangulate to lanceolate or foliaceous, deciduous, connate to each other, forming a tuber or sheath, toothed or laciniate.

Its flowers are actinomorphic or somewhat irregular. Its calyx is 4-lobed, glabrous but corolla is absent. Petals are separate which are orange or yellow in colour. It has fertile stamens which are 6-8 in numbers & completely free, separate. Its Filaments glabrous & pink or red in colour, Style is terete.

Fruit is legume type, unilocular, freely dehiscent, oblong or ellipsoidal, coriaceous or becoming woody, exserted from calyx, glabrous

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or glabrate, 1-10 seeded. Its seeds are ovoid to rounded in outline, olive, brown, or black.[11,12,13]

Phytochemical Study

Bark of plant shows the presence of (-) epicatechin, procyanidin p2,11'-deoxyprocyanidin B, , (24, £)- 24- methyl-cholesta-5-en-3p-ol (22 E, 21£)-24-ethycholesta-5, 22 dien-33-ol, (24£)-24-ethylcholesta-5-en-3-p-ol, leucopelargonidin-3-O-p-D glucoside, leucopelargonidin and leucocyanidin, (+) catechin.

The flower part of plant contain Oleic , linoleic, palmitic and stearic acids, P-sitosterol, quercetin, kaempferol- 3-0-P-D- glucoside, quercetin- 3-0-P-D-glucoside, apigenin- 7-0-p-D- glucoside, pelargonidin- 3, 5- diglucoside, cyanidin-3, 5- diglucoside, palmitic, stearic, linolenic, linoleic, p and y sitosterols, leucocyanidin and gallic acid.

Seed and Pod contains oleic, linoleic, palmitic and stearic acids, catechol, (-) epicatechol and leucocyanidin. Five lignan glycosides, lyoniside, nudiposide, 5-methoxy-9-β-xylopyranosyl-(−)-isolariciresinol, icariside E 3, and schizandriside, and three flavonoids, (−)-epicatechin, epiafzelechin-(4β→8)-epicatechin and procyanidin B 2, together with β-sitosterolglucoside, were isolated from dried bark.[14,15,16]

Roots contain resinous and extractive matter, gum, sugar, coloring matter and salts of lime. Coloring matter consists of red crystalline principle purpurin; a yellow principle glucoside-manjistin, garancin, alizarin (orange red) and xanthine (yellow).[17]

Pharmacognostical Features

Microscopical Characters

- ***Bark***

Transverse section of stem bark shows periderm consisting of a wide layer of cork, radially flattened narrow cork cambium, secondary cortex wide with one or two continuous layers of stone cells with many patches of sclereids, parenchymatous tissue contains yellow masses and prismatic crystals: secondary phloem consists of phloem parenchyma, sieve tubes with companion cells and phloem fibres occurring in groups, crystal fibres present.[24]

- ***Stem***

Transverse section of stem is circular. Small rounded to oval projecting lenticles are present on the surface. Epidermis is single layered with thin cuticle. Below the epidermis, 5-6 layers of cork are seen. Cortex is 12-16 layered. In the middle region of cortex, 3-5 layers of stone cells are clearly visible. Just above, the phloem region is very distinct and contains tannin cells. Cambium is very clear and is 2-3 layered. Xylem region is composed mostly of tracheids and a few vessels. Primary xylem is prominent. There is prominent pith, composed of thin walled parenchyma and many of the pith cells contain polygonal calcium oxalate crystals.[24]

- ***Root***

In transverse section, the root appears somewhat circular in outline. The outermost zone is cork, composed of 8-10 layers of tangentially elongated thick walled cells. Phellogen is not distinct. Inner to the cork region, secondary cortex having two distinct zones are seen. The upper zone consists of 5-7 layers of thin walled parenchyma cells, some of them containing few small rounded starch grains. Below this parenchymatous one, 3-5 layers of mechanical cells are definitely seen, of these the outer layer is schlerenchymatous and the inner layers are stone cells. Following this supporting region is a broad zone of primary and secondary phloem. The cells are parenchymatous, thin walled and polygonal. 4-6 cambial layers are very prominent below the bast zone. In secondary xylem region tracheids, vessels and parenchyma cells are arranged in a peculiar manner, i.e., xylem parenchyma and tracheids are in alternating patches. The ray cells in the secondary xylem region are filled with starch grains. Exarch primary xylem groups are seen towards the centre which is in a line with the medullary rays.[24]

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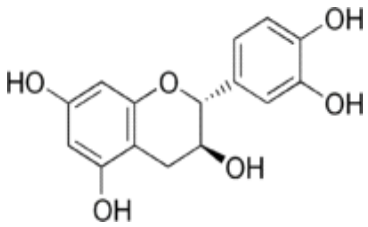
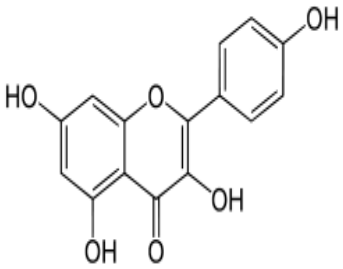
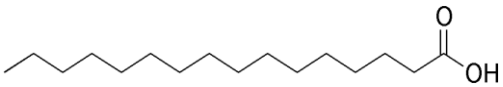
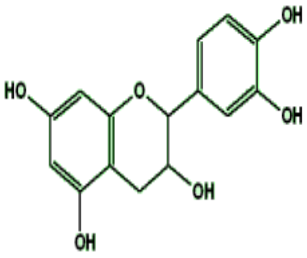
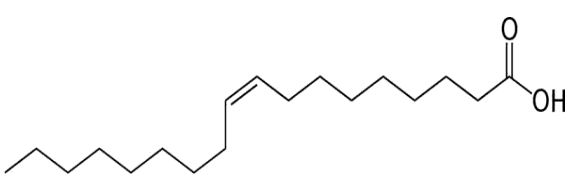
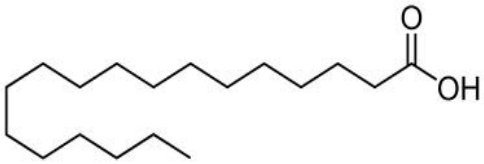
Table: 1 Spectroscopy of some chemical constituent of *Saraca indica*

Name	Structure	Spectroscopy	Reference
Catechin		UV-Vis- Lambda-max: 276 nm IR- 1600 cm^{-1} NMR (Proton NMR) 2.49 ppm, Mass spectroscopy ESI-MS [M+H]+ m/z : 291.0	18
Kaempferol		Rf value 0.64 UV Spectrscopy 263 nm & 365 nm 1HNMR 400 mHz Mass spectroscopy 285m/z	19
Palmitic acid		NMR spectroscopy: 1H NMR 2.29 ppm C13 NMR 6.7 ppm	20
Epicatechin		Mass spectroscopy molecular ion peak m/z 650 Base peak m/z 368 NMR 7.0 ppm	21

Structures of Some Chemical Constituents



Oleic Acid[22]



Stearic Acid[23]

- ***Powder Characters***

Ashoka bark powder brown in colour, under microscope it contain some tracheids, large quantity of fibres, stone cells, parenchyma cells, sieve tube fragments and many unidentified cells.[25]

Pharmacology

Oxytocic activity of the plant was seen in rat and human isolated uterine preparations. Estrogen-primed or gravid uterus was more sensitive to the action of the alcoholic extract. The bark of Ashoka, which is the real potent drug, is reported to have a stimulating effect on the endometrium and ovarian tissue and is therefore very valuable in treating problems like menorrhagia due to uterine fibroids, in leucorrhea and in internal bleeding. Ashoka or Saraca indica is helpful in all cases of uterine bleeding.[26]

Ashoka is blood purifier & used in all skin diseases, ammenorhea, dysmenorrhea menopause, menorrhagia, painful menstruation blood circulation and purification, cancer, diarrhea, dysentery, edema, heart disease, hepatitis, herpes, jaundice, joint pain, kidney and gall stones, , paralysis, skin problems, rheumatoid arthritis, obstructions in urinary passages.[27]

Therapeutic Classification[17,28,29]

Central Nervous System

Dried root is used in paralysis, hemiplegia and visceral numbness. If taken to an extent of 3 drachms it affects the nervous system causing temporary delirium.

Blood and Haemopoeitic Tissue

It acts as a vulnerary and hastens healing time of skin trauma and broken bones.

Skin

Paste of roots is useful in freckles and external inflammations, ulcers and skin diseases. Specifically used to clean, cool and clear the blood. Used for itching in eczema, psoriasis, dermatitis, and herpes-kushta/visarpa.

It is a favourite herb to help relieve Pruritis. Also used in scabies and Tineapedis.

Externally it also benefits this conditions- use as a wash or in a cream.

Bark of tree rejuvenates the complexion and skin tone. May be applied in discoloration or loss of pigmentation.

Genito-Urinary System

Root is used in obstruction of urinary passage and ammenorhea. It is drunk after delivery to procure copious lochial discharge.

It is capable enough to dissolve oxalic tones present in kidney. It is useful in signs of congested uterus and pain, painful periods, fixed pain, clots and ammenorhea, endometriosis.

Musculoskeletal System

Decoction is useful in rickets, delayed bone consolidation and calcium deficiency.[17,28,29]

Other benefits[27]

Diabetes

Dried flowers of Ashoka are used for diabetes treatment.

Dysentery

For treatment of dysentery, decoction is used. Fluid extract of Ashoka flowers is used to treat haemorrhagic dysentery. This fluid is prepared by grinding its flowers with water.

Piles

Bark of the tree is used for cure of internal piles. Decoction is used to cure piles.

Insect Bite

The bark of the tree is used to treat scorpion bite.

Blood Purification

Ashoka is used to prepare Ayurvedic tonics to purify blood.

Worm Infestation

The leaves and bark are used to get rid of worms in stomach.

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Table 2: Various activities reported in Saraca indica

Activity	Animal/ model	Plant part /extract	Result	Ref.
Antihypreglycemic and antioxidant activity	Swiss albino mice Model-Streptozotocin induced model for antihypertensive activity Scavenging of hydrogen peroxide & 1,1-diphenyl-2-picryl hydrazyl antioxidant assay	Part-Leaves, Extract-Petroleum ether, chloroform, methanol extract	Standard drug and different extracts showed dose-related reductions in the serum concentrations of TC, TG, LDL, VLDL, TG, SU and SC but caused the reverse effect on the serum concentration of HDL and TP. All extracts exhibited good but varying levels of antioxidant activity	30
Antipyretic activity	Wistar rats & swiss albino mice Model- Brewer's yeast induced pyrexia	Part- Seed Extract- Pet. ether, chloroform, acetone, methanol & water	The acetone extract of the seeds of S. Asoka may be responsible for the antipyretic effect.	31
Antitumor, antioxidant and cytotoxic activity	Adult Swiss male albino mice Model- Brine shrimp lethality assay, Trypan blue dye exclusion method	Part- Leaves Extract-Petroleum ether	The extract has significant capacity to inhibit the growth of solid tumor induced by EAC cell line in a dose dependent manner.	32
Anthelmintic activity	Earthworm	Part- Leaves Extract-Ethanolic, methanolic extract	The methanolic & etanolic extract display the anthelmintic activity in a dose dependent manner.	33

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Central Nervous System Depressant Activity	Albino mice Model- Pentobarbitone induces sleeping time, Locomotor activity using actophotometer	Part- Leaves Extract- petroleum ether, chloroform, methanol and water	Extracts of *Saraca indica* Significantly decreased the locomotor activity in mice.	34
Analgesic & Antipyretic activity	Albino rats Model- Tail flick method Brewer's yeast-induced pyrexia method	Part- Leaves Extract- Ethyl acetate	The extract significantly inhibited the tail flick response of rats and increased the reaction time after dose administration.	35
Antimicrobial activity	*S. aureus*, *E. coli*, *P. aeruginosa*, *B. cereus*, *K. pneumoniae*, *P. mirabilis*, *S. typhimurium*, *S. pneumoniae*, *C. albicans*, *C. albidus* Model-Disc diffusion method	Part- Stem bark Extract- chloroform, methanol, aqueous & ethanol	The methanolic and water extracts of stem bark of *Saraca indica* were very effective against most of the bacteria tested and especially against *Bacillus* species and *Pseudomonas aeruginosa*	36

Gynaecological Disorders

The bark of the tree is used to cure excessive loss of blood during menstruation in presence of leucorrhoea, uterine fibroids and other reasons. The bark is taken as a decoction and used as a substitute for a dried fungus, Ergot used to cure the uterine hemorrhgaes.[28]

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