

Phytochemical and Pharmacological Importance of

Saraca indica

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ABSTRACT

Ashoka is the most ancient tree of India, known as a *Saraca asoca* (Roxb.), De.wild or *Saraca indica* belonging family *Caesalpinaceae*. *Saraca indica* is reported to contain glycoside, flavonoids, tannins and saponins. It is used as spasmogenic, oxytocic, uterotonic, anti-bacterial, anti-tumour, anti-progestational, antiestrogenic activity against menorrhagia and anti-cancer. This review contains phytochemical constituent and pharmacological activity of various parts of plant.

Keywords: *Saraca indica*, Phyto-chemistry, Pharmacology.

INTRODUCTION

Herbal medicine has such an amazing influence that various alternative medicine therapies with herbal remedy, Unani and Ayurveda. Ashoka is one of the most legendary and sacred trees of India. Ashoka tree, universally known by its binomial Latin name *Saraca asoca* (Roxb.), De.wild or *Saraca indica* belonging to family *leguminaceae*. In the Ramayana, one of the books of Hindu mythology, there is mention of Ashoka tree. Ashoka means "without Sorrow" a reference to this bark's reputation for keeping healthy and youthful and Buddha was said to be born under this tree. *Saraca indica* is grown all over India. It cultivated in many gardens for evergreen beautiful foliage. The Ashoka tree belongs to the family of legumes and is a part of the subfamily *Caesalpinaceae*. It was originally found mainly in the middle part of the Western Ghats in western India. This tree has an important role in Indian cultural traditions. The Ashoka tree's dried bark contains tannins, sterol, catechol, and other organic calcium compounds. The powered bark of the tree also contains Aluminum, strontium, calcium, iron, magnesium, phosphate, potassium, sodium, and silica. In order to maintain the medicinal values and physicochemical properties of the Ashoka herb. The Ashoka tree has many health benefits and has long been used in traditional Indian medicine as a key ingredient in various therapies and cures. One of the uses of the Ashoka herb is in the treatment of menstrual disorders associated with excessive bleeding, congestion, pain, dysmenorrhoea, abdominal

pain, and uterine spasms. The Ashoka herb benefits the endometrium and uterine muscles and this makes it effective as a uterine tonic for irregular menstrual cycles and miscarriage. It is also effectively used in Ayurveda for clearing congestion from the Medas Dhatus and Mamsa, especially when there may be leucorrhoea, endometriosis, cysts, and fibroids from excess kapha and ama in the Artava Srotas. The Ashoka herb also has a nourishing effect on the circulatory system, thereby making it an effective remedy in arrhythmia and cardiac weakness. The Ashoka herb also helps in encouraging urine flow and thus helps in treating conditions that cause painful urination. The specific analgesic properties present in Ashoka can be used to calm the nerves when they have been aggravated by the Vata. The Ashoka herb is also said to improve the complexion of skin. This herb can be used to obtain relief from burning sensations on the skin. It also helps to get rid of the toxins from the body. The Ashoka herb is also effective in purifying the blood naturally and in preventing skin allergies.

Vernacular name

Kankeli (Sanskrit), Ashoka (Assamese), Ashoka (Bengali), Ashoka (Gujrati), Ashoka (Hindi), Ashokadamara (Kannada), Ashok (Kashmiri), Asokam (Malayalam), Ashok (Marathi), Ashoka (Oriya), Ashok (Punjabi), Asogam (Tamil),

Classification

Kingdom: Plantae
Division: Magnoliophyta

Class: Mgnoliopsida
Order: Fabales
Family: Caesalpinaceae
Genus: Saraca
Species: indica

Phytochemistry

The Phytochemical study shows the presence of various chemical constituents of Ashoka plant. Bark- procyanidin, epicatechin, 11'-deoxyprocyanidin B, catechin, leucopelargonidin and leucocyanidin. Flower- Oleic, linoleic, palmitic and stearic acids-sitosterol, quercetin, kaempferol, quercetin, apigenin- 7-0-p-D-glucoside, Pelargonidin- 3, 5- diglucoside, cyanidin-3, 5- diglucoside, palmitic, stearic, linolenic, 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, isolaricresinol, and schizandriside, and three flavonoids, epicatechin, epiafzelechin-(4 β →8)-epicatechin and procyanidin B2, together with β -sitosterol glucoside, were isolated from dried bark.

Pharmalogical activity

Antimicrobial activity

Saraca indica was subjected to antibacterial activity (ethanol: water, 1:1) on agar plate with different organisms such as *Bacillus subtilis*, *Escherichia coli*, *Salmonella typhosa*, *Staphylococcus aureus*, (plant pathogen). *Agrobacterium tumefaciens* showed negative activity. *Saraca indica* dried flower buds tested against antibacterial activity of methanol extract on agar plate against *Salmonella viballerup*, *Shigella boydii*, *Escherichia coli*, *Vibro cholera*, *Shigella flexneri* and *Shigella dysenteriae* showed active. *Saraca indica* leaves tested against antibacterial activity of ethanol (95%) and water extract on agar plate *Escherichia coli*, *Staphylococcus aureus*. *Escherichia coli* were found active whereas tested against *Staphylococcus aureus* gave negative result. The methanolic extracts of *Saraca indica* was assayed against *Alternaria cajani*, *Helminthosporium sp.*, *Bipolaris sp.*, *Curvularia lunata* and *Fusarium sp.* at different concentrations (1000, 2000, 3000, 4000 and 5000 μ g/ml). The extracts exhibited good inhibitory activity against *A. cajani*, while it effective at lower concentrations against other fungi also. Four different extract of *Saraca asoca* bark tested antibacterial activity against *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus cereus*, *K. aerogenes*, *Sh. Boydis*, *P. vulgaris*. Different extract of *Saraca*

asoca bark were screened against the enteric pathogen isolates, namely, *Escherichia coli*, *Shigella sonnei* and *Salmonella enteritis*. All the extracts other than aqueous extract showed antimicrobial activity with the methanol extract having the highest percentage of activity. Methanol and water extracts of *Saraca asoca* leaves exhibited good activity against *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Salmonella typhimurium*. Both extracts showed marked activity against *Alternaria alternate*, *colletotrichum gloesporioides* and *Drechlera specifera*. Bark extracts of *Saraca asoca* (Roxb.) de Willde were investigated for in vitro antibacterial activity against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Bacillus aureus* and *Klebsiella pneumoniae* at 4 mg/ml using agar well diffusion method. The ethanol and distilled water extracts showed significant broad spectrum antibacterial activity. The crude extracts of leaves, flowers, and bark of *Saraca asoca* were screened for larvicidal activity for 24-48 h at an initial concentration of 1,000 ppm against early IV instar larvae of the vector mosquitoes viz., *C. quinquefasciatus*, *A. aegypti*, and *A. stephensi*. The petroleum ether extract of *S. indica/asoca* leaves and chloroform extract of the bark exhibited more than 50% larval mortality against *C. quinquefasciatus* larvae at an exposure period of 48 h.

Anticancer activity

The anticancer principle from *Saraca indica* flowers indicated 50 percent cytotoxicity (in vitro) in Dalton's lymphoma ascites and Sarcoma-180 tumour cells at a concentration of 38 μ g and 54 μ g respectively, with no activity against normal lymphocytes but preferential activity for lymphocytes derived from leukemia patients.

ANTIMENORRHAGIC ACTIVITY

Ashoka dried bark has been used for menorrhagia in India. In India *Saraca indica* dried bark as well as flower is given as a tonic to ladies in case of uterine disorders. *Saraca indica* stem bark also used to treat all disorder associated with the menstrual cycle. Ashoka bark in Sri Lanka used for menstrual disorder and menorrhagia. Ashoka bark in India, used as a uterine sedative and hot water extracts administered to human adult female stimulates the uterus similar to ergot, but without producing tonic contraction. Also employed in menorrhagia, as an emmenagogue, uterine sedative, uterine affections as well as used in several preparations related to female

troubles. *Saraca indica* bark, in Pakistan, employed for uterine affection and menorrhagia. *Saraca indica*, in India, dried bark, used as an astringent in menorrhagia, to stop excessive uterine bleeding, also as a refrigerant, demulcent, uterine disorders, regular menstrual pain in abdomen, used for uterine problems. Aqueous extract of the bark is reported to contain active principles, one stimulating and the other relaxing the plain muscle of the ileum of the guinea pig. The drug is reported to stimulate the uterus, making the contraction more frequent and prolonged. The crystalline glycoside substance is also reported to stimulate uterine contraction.

Antioxytotic activity

Oxytotic 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. Pentolinium bitartrate completely blocked the oxytotic action. Seed extract is found effective against dermatophytic fungi. In vitro tests on rat uterus preparation, extracts of *Saraca indica* did not show oxytotic activity. Ashoka has been tested twice previously with negative results and once with positive results.

Antidiabetic activity

Dried powder of the plant *Saraca indica* is taken with milk or decoction of Ashoka bark is taken twice a day for the treatment of diabetes.

CNS depressant activity

The leaves of *Saraca indica* shows CNS depressant activity in various solvent such as petroleum ether, chloroform, methanol and water respectively depending upon their polarity. The activity was evaluated using phenobarbitone induced sleeping time by using actophotometer. The extract of *Saraca indica* significantly decreased the locomotor activity in mice by 67.33%. Thus we concluded that leaf of *Saraca indica* possess CNS activity.

Antiulcer activity

The aqueous suspension of *Saraca indica* flowers are used against gastric ulcer in albino rats. The major constituent of *Saraca indica* flowers contains saracasin, saracadin, waxy substance, fatty acids and flavonoids etc. So the flowers of *Saraca indica* suspension exhibit an antiulcer potential activity through at least one or more possible mechanism including inhibition of basal gastric secretion, stimulation of mucus secretion and

endogenous gastric mucosal prostaglandin synthesis.

Anti-inflammatory activity

The ethanolic extract of *Saraca indica* leaves find out the anti-inflammatory activity. The leaves of *Saraca indica* determined the anti-inflammatory activity against Carrageenan induce paw edema in animal is most suitable test procedure to screen anti-inflammatory activity. The ethanolic extract of *Saraca indica* reduce the paw edema significantly ($P < 0.01$). The plant extract at dose of 200 mg/kg showed significant anti-inflammatory activity. It caused 56.95% inhibition in increase paw volume, though of a short duration and intensity, as compare to that of 10 mg / kg diclofenec.

Uterine tonic activity

Saraca indica is outstanding in ayurvedic medicine for its use as a stimulant to the endometrium and ovarian tissue. The estrogenic effect of U-3107 (1mg/kg p.o) was considered in normal and ovariectomised rats. U-3107 was administered as an aqueous suspension for a period of 21 days. The management of ovariectomised rats did not any expand on uterine weight. U-3107 holds estrogenic activity only in the presence of functional ovary and is devoid of any progestational activity. U-3107 is herbal preparation formulated with different plant extract which are useful in a variety of menstrual disorders such as puberty, menorrhagia, Dysmenorrhagia, premenstrual syndrome, abnormal bleeding and threatened abortion.

Analgesic activity

Saraca indica leaves extracts are accountable for analgesic activity. The leaf extracts like petroleum ether, chloroform, methanol and water were investigated for Phytoconstituents like sterols, glycosides, saponins, carbohydrates alkaloids, flavonoids, tannins, protein etc. The analgesic activity above extract was evaluated by using tail immersion method and formalin induced pain method in albino mice. Analgesic activity of petroleum ether, chloroform, methanol and water extracts create dose dependent analgesic activity, formalin test is one of the principle analgesic models to compare with clinical pain. In the early phase of formalin test pain arise due to the direct stimulation of the sensory nerve fibers by formalin while in the late phase pain was due to inflammatory maditors like histamine, prostaglandins, serotorin and bradykinins.

Larvicidal activity

Saraca indica, the pet ether extract of the leaf and the chloroform extracts of the bark were effective against the larva of *C. quinquefasciatus* with respective LC₅₀ value. The Larvicidal bioassay follow the WHO standard protocols for experimental treatment, 1ml of plant extract dissolved in absolute ethanol was added to 99 ml of distilled water in 150 ml disposable wax coated paper cup, which was shaken lightly to ensure a homogeneous test solution. Then 25 early fourth instar larvae of vector mosquito were transfer to each experiment was performing in four replicates with a final total of 100 larvae for each concentration. The test containers were held at 27±2°C, 80-90% relative humidity and photoperiod of 12h dark. After 24h exposures larval mortality was recorded. The experiments were repeated twice. The pet ether extracts of leaves of *Saraca indica* showed Larvicidal activity with LC₅₀ and LC₉₀ values of 228.9-458.3 ppm respectively. The chloroform extract of the bark of *S. indica* also show larvicidal activity with LC₅₀ and LC₉₀ values of 291.5 and 499.3 ppm respectively.

CONCLUSION

Saraca indica is highly regarded as an universal panacea in the ayurvedic medicine. It is one of the universal plant having medicinal activities. This versatile plant is the source of various types of compounds. In the present scenario many plant are used to treat many diseases. But *Ashoka* is ancient and reliable source of medicine so *Ashoka* is used in many pharmacological activities. It have many uses like to treat skin infections, CNS function, genitor-urinary functions. As the global scenario is now changing towards the use of nontoxic plant product having traditional medicine use, development of modern drug from *Saraca indica* should be emphasized for the control of various diseases.

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