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Review Article

Identify And Evaluate The Phytochemical Properties Of Ashoka Bark In Fibroids

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ABSTRACT

In India, about 80% of the rural population uses medicinal herbs or indigenous systems of medicine. Generally, in traditional system of medicine, many herbal drugs are combined in the form of a multi-herbal formula to enhance their functions. Saraca asoca, often known as Ashok chaal, is a Holi tree. It is India's oldest and most revered tree. This species belongs to the family Fabaceae, sub-family Caesalpinioideae. Uterine fibroids, also called leiomyomas or myomas, are benign, monoclonal tumors of smooth muscle cells of the myometrium and are the most common gynecological tumors in women. There is therapy like medication, surgery available for fibroids, Among other alternative therapies, herbal treatments for fibroids are used in several medical traditions and countries. Ashoka is used to treat feminine disorders since ages, such as menorrhagia, leucorrhoea, dysfunctional uterine bleeding bleeding, haemorrhoids etc. This versatile plant is the source of many phytochemical compounds such as, flavonoids, tannins, saponin, glycosides, proteins, steroid etc. Beyond this important characteristic of Ashoka some lacunae remain in the research studies of Ashoka plant like lack of comprehensive modern scientific investigations.

INTRODUCTION

Since ancient times, herbal therapies have been primary source of medicines around the world. About 75-80% people of the world are still depending on plant or plant derived remedies for their basic healthcare. It is still popular and widely accepted in emerging countries due to better availability, cheap price and no or less side effects. In many countries, herbal preparations or herbal extracts are prescribed as medicines and their sales are increasing day by day. Similar to synthetic medicines demands, natural product or natural product derived semi synthetic medicines or herbal extracts market is raising aggressively. Adverse side effects of synthetic medicines have leaded the Western countries to look after eco-friendly and bio-friendly natural remedies to cure and prevent different human diseases. Indeed, the plant

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kingdom still occupies many varieties of plants containing molecules of therapeutic property which have until now to be investigated. In the recent years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects such as hypoglycemia, weight gain, gastrointestinal symptoms and peripheral edema as compared to synthetic drugs. The World Health Organization (WHO) has listed 21,000 plants, which are used in healthcare around the world. Among these 2500 species are in India, out of which 150 species are used commercially. India is one of the largest producer and consumer of medicinal herbs and is called as botanical garden of the world. WHO estimates that herbal medicines provide primary healthcare for approximately 3.5 to 4 billion people worldwide, and about 85% of traditional medicine involves the use of plant extracts which may be called "modern herbal medicine".

Uterine fibroids

Uterine fibroids, also called leiomyomas or myomas, are benign, monoclonal tumors of smooth muscle cells of the myometrium and are the most common gynecological tumors in women.Fibroids are a major public health burden, as they are a considerable cause for female morbidity, impaired quality of life and are worldwide the leading indication for a hysterectomy.As 40% of women all over the world underwent a hysterectomy by the age of 64, it is the most frequently applied surgery in women, resulting in considerable annual health care and societal costs. Uterine fibroids or myomas represent benign hormone-dependent tumors of smooth muscle on the uterine wall, occurring in 20–60% of women of reproductive age. The development of fibroids is related to various risk factors, such as age, race, hormonal factors, uterine infection, obesity and behavioral factors, but the epidemiological data are inconsistent. Generally, they are asymptomatic, and only about 30% of these fibroids are large enough to be discovered by a health care practitioner during a physical examination. In addition, approximately one-third of them develop serious clinical manifestations, such as abnormal uterine bleeding, anemia, back pain, pelvic pain and pressure, constipation, urinary frequency or infertility, thus necessitating treatment. Moreover, fibroids have been linked to poor obstetric outcomes. Fibroids are found in 0.1–10.7% of pregnant women, and their prevalence rises if women want to postpone having children until a later age. Pregnancy-related hormones influence the size of uterine fibroids, and fibroids have many impacts on pregnancy. Women with uterine fibroids in pregnancy generally have concerns related to adverse outcomes.

SARACA ASOCA

Saraca asoca, often known as Ashok chaal, is a Holi tree. It is India's oldest and most revered tree. Since ancient times, the Vaidyas of the Unani and Ayurvedic medical systems have used it as medicine. Every Indian local population accepts the tree. It was discovered after a thorough analysis of the canonical Ayurvedic texts that Ashoka is mentioned in the Vedas, Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. Ashoka is one the most historical and sacred tree of India. It is known by way of its binomial nomenclature Saraca asoca (Roxb.) De. Wilde. Belonging to Caesalpiniaceae subfamily of the legume. It’s far noted in Hindu mythology that the Indian truth seeker and founder of Buddhism, Gautama Siddhartha (c.563-483 B.C.) was stated to have been born beneath this tree. In Indian epic poetry the Ashoka tree mentioned within the Ramayana in connection with the ‘Ashoka Vatika’, in which Hanuman first meets Sita. The Ashoka is a rain- wooded area tree. Its authentic distribution turned into inside the imperative areas

of Deccan plateau, as well as the middle section of the Western Ghats inside the western coastal area of the Indian subcontinent. The Ashoka is valued for its beautiful foliage and fragrant plants. The flowers being tons used for non-secular ceremonies and temple decorations. It is a small, erect, evergreen tree, with deep green leaves growing in dense clusters. Its flowering season is around February to April. The Ashoka flowers are available in heavy, lush bunches. They are shiny orange yellow in coloration and will become red before they fall. In classical Ayurvedic textual content. Ashoka has been referred to in vedanasthapanamahakashaya and Kashayaskandha by means of aacharyacaraka. Aacharya Sushruta covered Ashoka in Rodhradigana. As all of us recognize Ashoka is the drug of preference in Raktapradara (dysfunctional uterine bleeding) however this action of Ashoka turned into no longer mentioned in Ayurvedic textual content like Charakasamhita, Sushrutasamhita and in Nighantus.Vrundamadhava was the first who described use of ashoka in Raktapradara. Ashoka is the well-known drug for feminine disorders, inspite of those Aacharya Sushruta has been referred to using Ashoka in Kalyanakalawana of Vatvyadhichikitsa, in Tilvakasarpi, Vranavachoornan, krushabhaagada, Dundubhiswaniya bankruptcy, in eye sickness (mainly pitta-kaphaj), in Mahakalyanakaghruta. Also, aacharyaVagbhata has been noted the use of Ashokaghruta.

Historical view

Ashoka is one of India's most old and revered trees. Saraca asoca (Roxb.) De. Wilde and Saraca indicia Linn are the binomial names for it. The Sanskrit word Asoka orAshoka means "without sorrow." It is said in Hindu mythology that the Indian philosopher and founder of Buddhism, Gautama Siddhartha (c.563-483 B.C.) was bornunder this tree; it is worshipped every year on December 27 for the Hindu god of Love,Kamadeva; it is mentioned in Hindu mythology that the Indian philosopher and founderof Buddhism, Gautama Siddhartha (c.563-483 B.C.) was said to have been born underthis tree (Pradhan and Joseph, 2009). In Ramayana, the Ashoka tree mentioned in inreference to the 'Ashoka Vatika', where Hanuman went to search Sita. Ashoka isconsidered as a rain- forest tree. The innovative allocation of this plant species was in thecentral areas of Deccan plateau and the middle section of the Western Ghats of India.

Botanical Description Taxonomy

Kingdom: Plantae Division: Magnoliophyta Class: Magnoliospida Order: Fabales

Family: Caesalpinaceae Genus: Saraca

Species: asoca

Botanical name: Saraca asoca

Synonym: Saraca indica

Vernacular Names Hindi : Ashok, Asok Bengali: Asok, Asoka English: Asoka Tree

Guajarati: Ashopalava Canarese: Akshath Marathi: Ashoka, Jasundi Malayalam: Hemapushpam Panjabi: Asok

Sanskrit: Madhupushpa

Tamil: Apashoka, Ashok, Chitra, Anagam Telugu: Doshahari, Asogam, Asogu, Asukamu Oriya: Gandhapushpa, Osoko

Urdu: Ashok Chhaal

Synonyms

Ashok, Shoknashan, Smaradhivas, Kankeli, Vanjuldrum, Raktapallava, Hempushpa, Nata, Pindapushpa, Gndhapushpa, Madhupushpa.

Habit and Habitat

Saraca asoca has been identified in substantial quantities in the Malayan Peninsula, Myanmar, Sri Lanka, and Bangladesh. It is cultivated in Indonesia. It is mostly found in Assam's Khasi hills, West Bengal's hilly parts, Maharashtra's Western Ghats, and India's northern regions. Its original distribution included major portions of the Deccan Plateau, as well as significant components

of the Western Ghats in the Indian Subcontinent's western coastal region. Central and Eastern Himalaya, Eastern Bengal, Western Peninsula, Burma and Malaysia are all places where the tree can be found.

Cultivation

It may be found in evergreen woods up to an elevation of 750 meters all over the Indian Subcontinent. The ideal soil for this plant's growth is red laterite alluvial. Seeds are used in the propagation of this plant. It thrives in tropical and subtropical environments. The plant prefers soil that is wet and well-drained. The red laterite alluvial soil is said to be ideal for plant growth. It asks for a rainfall range of 2000-4000 mm per year, with temperatures ranging from 35 to 40 degrees Celsius. Top boom prefers deep, moist soil, primarily near water bodies. It is vulnerable to frost and fire. It has a low coppicing potential. It is a tree that prefers to be in the shade. In the months of February and April, the plant produces mature seeds, which can be collected from the ground when they fall. The seeds are steeped in water for twelve hours before being sown on extended beds. Germination takes roughly twenty days. Plants with a half-life of 1/2 to 365 days are used for subject planting. Farm Yard Manure, applied at a rate of 10 kg per tree per year, is beneficial to plant growth. During the warmer season, the flora will be irrigated. At 20 years, the tree is shrinking to remove the bark. To sell sprouts, it must be done during the wet season.

Morphology

Bark

The bark is dark brown, grey, or almost black with a reddish wood and has a warty surface, sometimes cracked. Rough and uneven bark is channeled and smooth with circular lenticels. Bark has a bitter, sweet, and astringent taste.

Leaves

Glabrous leaves are long, corky at the base, and bitter.Petiolesare short and the leaves are united such that 6-12 pairs form a leaflet.Leaflets are glabrous and oblong-lanceolate in shape.The youngleaves are copper red when they germinate and start turning lightgreen and then dark green as they mature.

Flowers

Flowers are seen as dense axillarycorymb of orange and yellow color seen from January to March,though they are seen throughout the year. They are aromatic,hermaphrodite, and staminate, and astringent in taste.Each clustercontains many small, long tube flowers opening into four oval lobesand has half-white, half crimson stamens protruding from the ringat top of each tube. The flowers are yellow when young, graduallyturning to orange and crimson as they mature. Eventually, they turninto vermillion due to the sun's ray's effect. The tree bears flowersfrom December to May, with peak flowering from February to March.

Seeds and pods

The seeds are flat, ovoid-ellipsoid in shape, and are covered witha brown seed coat. Two to eight seeds are found within each pod.The pods are dehiscent and tapering at both ends.33 The green podsare leathery and turn brownish-purple and black, as they ripen andget ready to disperse the matured seeds. The green seeds turn black asthey mature and are recalcitrant.

Roots

Roots are long, slightly hard, and grey-brown. They have a taproot system with profused side roots.

Pharmacognostical characteristics

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 fibers occurring in groups, crystal fibers are present.

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 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 mostly composed 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.

Root

In transverse section root is 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 parenchymatous cells, some of them containing few small rounded starch grains. Below this parenchymatous one, 3-5 layers of mechanical cells are distinctly seen, of these the outer layer is schlerenchymatous and the inner layers are stone cells. Powder characters

Ashoka bark powder is brown in colour, under microscope it contains some tracheid's, large quantity of fibers, stone cells, parenchyma cells, sieve tube fragments and many unidentified cells.

Analytical parameter

Table 1: Analytical parameter

Colour	Brown
Oduor	Characteristic
Taste	Characteristic
Appearance	Free flowing powder

Phytochemistry

Bark

For therapeutic purposes, the bark of S. asoca is the most significant organ. Flavonoids, tannins, steroids, volatile oil, glycosides, steroidal glycosides such as sitosterolglucoside, reducing sugars, and many potassium, sodium, calcium, aluminum, strontium, calcium, iron, magnesium, and phosphate compounds have all been identified.

Leaves

Alkaloids, steroids, flavonoids, tannins, saponins, terpenoids, polyphenolics, glycosides, and numerous sugars have been found in the leaves of S. asoca. The presence of polyphenolics like gallic acid and ellagic acid is thought to be responsible for the leaf extracts antioxidant action. Flowers

Oleic, linoleic, palmitic, and stearic acids, P-sitosterol, quercetin, kaempferol-3-O- P-D-glucoside, apigenin-7-O-p-D-glucoside, Pelargonidin-3, 5-diglucoside, cyanidin-3, leucocyanidin, and gallic acid are all present in the flower. Four anthrocyanin pigments have been removed from plant life, and beta and alpha sitosterol have been removed from plant fixed oil. Oleic, linoleic, palmitic, and stearic acids are found in Seed and Pod, as well as catechol, (-) epicatechol, and leucocyanidin. Tannins, flavonoids, saracasin, saracadin, waxy compounds, carbohydrates, proteins, and steroids have been found in the flowers of S. asoca.

Fruits

Various fatty acids, such as oleic, linoleic, palmitic, and stearic acids; sterols, such as catechol and epicatechol; and aflavonoid, leucocyanidin, have been found in fruits

Seeds

Various fatty acids, such as oleic, linoleic, palmitic, and stearic acids, sterols, such as catechol and epicatechol, and a flavonoid, leucocyanidin, have been found in the seeds of S. asoca. Saracin, a lectin derived from S. asoca seeds, has been shown to induce apoptosis and even mitogenesis in human Tlymphocytes.

Roots

Resinous and extractive matter, gum, sugar, colouring matter, and lime salts are all found in the roots. Purpurine, a red crystalline principle; garancin, a yellow principle; alizarin (orange red); and xanthine, a yellow principle

Pharmacological and Biological action

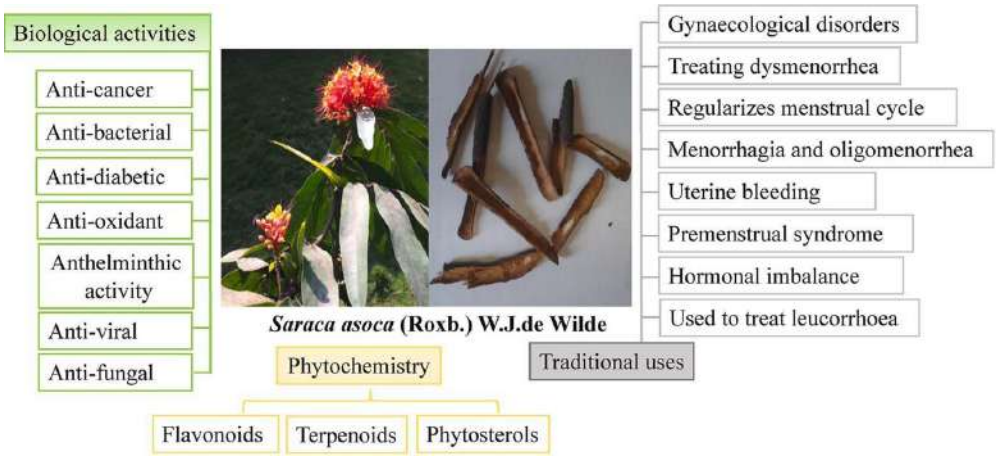

Figure 1: Pharmacological and Biological action

Antibacterial

Methanolic, ethanolic, acetone, and aqueous extracts of S. asoca bark, dried flower buds, and leaves have been shown to have antibacterial properties in numerous studies. These were tested against many bacteria with pathogenic characters including Bacillus subtilis, Escherichia coli, Salmonella typhus, S. typhimurium, S. typhi, S. viballe- rup, S. enteritis, Staphylococcus aureus, Bacillus cereus, Klebsiella pneumonia, K. aerogenes, Shigella boydis S. sonnei, S. flexneri, S. dyserteriae, Pseudomonas aeruginosa, P. vulgaris, Vibro cholerae, Proteus vulgaris, and so on. As a result, this plant appears to be a valuable resource for discovering single molecule antibiotics in the future, despite the fact that many human pathogenic microbes are becoming resistant to the recognized most significant antibiotics.

Antifungal

Traditionally, fungal infections were thought to be caused by a person's impaired immune system and did not pose a severe threat to the general public; nevertheless, there have been an increasing number of fungal disorder outbreaks in the past. As a result, scientific microbiology is concerned with finding new antifungal marketers. Several investigations have shown that S. asoca possesses antifungal properties. Plant extracts have been tested against a variety of fungal strains and have shown to be effective against the majority of them.

Antimennorhagic, oxytocic and uterine tonic

In India, the dried bark, root, and plants of S. asoca are frequently used to treat uterine irregularities, menorrhagia (excessive menstrual flow), ammenorhea, painful periods, endometriosis, and menstrual cycle difficulties. After transit, the root decoction of S. asoca is also used for improved lochial discharge. Experiments have shown that bark aqueous extract has the capacity to stimulate and loosen intestinal muscle, extend uterine contractions, and function as a uterine sedative. The bark's uterine tonic properties are linked to its estrogenic stimulating impact on the endometrium and ovaries. The bark's ethanolic extract has been shown to be efficacious on both gravid and estrogen-primed uteri. In vitro and in vivo on animal uteri and in vitro on human myometrial tubes, a phenolic glycoside P2 isolated from S. indica has been demonstrated to produce oxytocic action.

Anti-inflammatory, anti-arthritic and cardio-protective effect

The inflammatory response mediated by seasoned-inflammatory cytokines is largely blamed for chronic arthritis and cardiovascular problems. The ethanolic and methanolic extracts of S. asoca's leaf, bark, and root have been found to have anti-inflammatory properties by blocking the binding of a variety of transcription factors, including NF-B, AP-1, GATA-1, and others. To their target DNA sequences, reducing the levels of experienced-inflammatory cytokines.

Antiulcer

In albino rats, an aqueous suspension extract of S. asoca flora, dried flower buds, bark, and seeds was proven to reduce ulcers. Using two models, pyloric ligation (which increases the acid content material within the stomach) and aspirin-precipitated gastric ulcer, the anti-ulcer effect of the aqueous extract of S. indica flora was demonstrated in albino rats. When treated with the aqueous extract of S. indica, the amount of gastric juice produced, as well as the acidity and ulcer index, were significantly reduced when compared to the control rats in each of these trials. Saponins, triterpenes, tannins, catechin, sterols, phenolic glycosides, and flavonoids are thought to be responsible for the antiulcerogenic activity of those extracts.

Antioxidant, antidiabetic and hypolipidemic

A quantity of stories has defined the presence of various antioxidant compounds which includes ascorbic acid, catechin, flavonoids, lignin glycosides, beta- sitosterol and its glucosidic form, polyphenolics along with gallic acid in petroleum ether, chloroform and methanol extracts of S. asoca leaf, bark and flower. The flavonoid fraction of S. asoca flora and leaves has been shown to inhibit α-glucosidase and α- amylase enzymes related to kind- 2 diabetes and also prevent LDL (low density lipoprotein) oxidation.

Analgesic

In traditional remedy sources, there is a plethora of information on S. asoca's analgesic activity, which has been verified by studies using methanolic, petroleum ether, chloroform, and aqueous extracts of the bark and leaves. The potential of S. indica to suppress sensory nerve activity has been attributed to its analgesic properties, which have been experimentally proven through the use of three unique methodologies, namely tail immersion, tail flick, and formalin produced pain approach. Because inflammatory reactions contribute to pain relief, the anti-inflammatory activity of S. asoca over the duration of the past due portion of ache development could explain the analgesic impact of S. asoca. As a result, it's assumed that S. asoca extracts ease ache by way of acting on both cerebral and peripheral anxious structures.

Antimutagenic and Geno protective effect

Mutagenesis can cause cancer and other devastating diseases from any source. S. asoca has been described as a rich source of antioxidants that may help to prevent mutagenesis. Recently, it was discovered that S. asoca bark extract can prevent mutagenesis in Salmonella strains. This extract was also found to protect Swiss albino mice from cyclophosphamide-precipitated genotoxicity. Surprisingly, a lignin glycoside called ‘saracoside' isolated from S. asoca stem bark has been found to be a potent inhibitor of DNA topoisomerase IB, a key enzyme involved in a variety of processes involving DNA unwinding, including replication, transcription, and gene expression

Various phytochemical compounds present in different organs of Saraca asoca

Table 2: Phytochemical compounds present in Saraca asoca

Compounds	Class of compound	Plant organ	Activity
Acetylsalicylic acid	Phenolic acid	Seed	Analgesic

Gallic acid	Phenolic acid	Leaves,Bark,flowers	Hypolipidemic, antioxidant
Ellagic acid	Phenolic acid	Leaves,Bark,flowers	Antioxidant
Quercetin	Phenolic acid	Leaves,Bark,flowers	Antioxidant
Leucocyanidin	Flavanol	Seed, pod, bark	Anti-inflammatory
Leucopelargonidin	Flavanol	Bark, leaves	Anti-inflammatory
Benzene-1,2-diol	Catechin	Seed, pod, bark	Anti-inflammatory, antimicrobial
Epicatechin	Flavanol	Seed, pod, bark	Anti-inflammatory, antioxidant,
3 ,5-Dimethoxy epicatechin	Flavanol	Bark	Anti-inflammatory, antimicrobial
ProcyanidinB2	Flavanol	Bark	Antioxidant
Gallo catechin	Flavanol	Bark	Anti-inflammatory
Epigallocatechin	Flavanol	Bark	Anti-inflammatory, antimicrobial
Hematoxylin	Flavanol	Bark	Diagnostic purpose(staining of tissues)
Quercetin-3-*O*-P-D-glucoside	Flavanol glycoside	Flowers	Antioxidant
Pelargonidin-3,5-diglucoside	Flavanol glycoside	Flowers	Antidiabetic, anti-cataract
Cyanidin-3,5-diglucoside	Flavanol glycoside	Flowers	Antidiabetic
Lyoniside	Lignan glycoside	Leaves,Bark,flowers	Antioxidant

CONCLUSION

Saraca asoca is regarded as a universal panacea in the classical Indian text. Ashoka is used to treat femininedisorders since ages, such as menorrhagia, leucorrhoea, dysfunctional uterine bleeding bleeding,haemorrhoids etc. There are lot of references found in the Ayurvedic literature that, ashoka is the drug ofchoice in female troubles as it is endowed with large scale of pharmacological activities such as, anti-cancer,anti-menorrhagic, anti-microbial, larvicidal, anti- oxidant, anti- tumour, CNS depressant, anti-diabetic, antiestrogenic, anti-progestational, dermatoprotective, anti-mutagenic, genoprotective.

Ashoka is the well-known source of new and host plant – associated bioactive secondary metabolites.Pharmaceutical bioprospecting of Saraca asoca associated endophytes provide a new dimension to expandthe pharma worth of this plant.

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