

RESEARCH ARTICLE

ABUTILON INDICUM: A REVIEW ON ITS ETHNOBOTANY, PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE**S.V. Saranyaa^a and J. Dhanalakshmi^{b,*}**^aPh.D Research scholar, PG and Research Department of Biochemistry, Bharathidasan College of Arts and Science, Erode:638116, India.^{b,*}Associate Professor, PG and Research Department of Biochemistry, Bharathidasan College of Arts and Science, Erode:638116, India.

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Abstract

Medicinal plants have been used worldwide for a long time to treat human ailments, acting as a dependable source of medicine for various diseases and conditions within complementary healing systems. It is a native plant of tropical and subtropical regions of India, known for its significant medicinal benefits. The wide-ranging pharmacological impacts of *Abutilon indicum* arise from the existence of various categories of active biological substances within it. Traditionally, *A. indicum* has been employed to address various conditions, such as urinary issues, rheumatism, leprosy, ulcers, elevated fever, jaundice, pulmonary tuberculosis, gonorrhoea, as an aphrodisiac, bronchitis, mumps, urinary retention, along with specific neurological and hearing problems. Research has previously been carried out worldwide on the pharmacological, biological, and isolation of metabolites and biologically active compounds from this plant. Nevertheless, the research to assess the overall therapeutic properties of this plant still requires to be conducted. This document offers a concise summary of the pharmacological traits of *A. indicum* that could assist in upcoming clinical and experimental studies

KEYWORDS*Abutilon indicum*, Pharmacological activities, therapeutic values, human diseases.**Introduction:**

A. indicum (Indian abutilon, Indian mallow) is a small shrub belonging to the Malvaceae family, originating from the tropical and subtropical areas of India. In Sanskrit or Hindi, it is referred to as "Atibala." The term "Ati" means to "Very," while "Bala" signifies "Powerful," highlighting the attributes of this plant as highly potent. Malvaceae, also known as the mallows, is a family of flowering plants thought to encompass 244 genera with 4225 recognized species. Notable economically significant members comprise okra, cotton, cacao, roselle, and durian. Certain genera include well-known ornamental plants, including *Alcea* (hollyhock), *Malva* (mallow), and *Tilia* (lime or linden tree). The genera with the highest species counts are *Hibiscus* (434 species), *Pavonia* (291 species), *Sida* (275 species), *Ayenia* (216 species), *Dombeya* (197 species), and *Sterculia* (181 species). Traditional and folk medicine have long noted that *A. indicum* plants possess various pharmacological and therapeutic benefits. The phytoconstituents of *Abutilon indicum*, comprising roots, leaves, flowers, bark, seeds, and stems, have been used in traditional medical practices. *A. indicum* is utilized in traditional medicine as a pulmonary agent and sedative (leaves), aphrodisiac, laxative, and diuretic [1]. Additionally,




various parts of plants hold unique phytoconstituents that are accountable for their biological effects. Additionally, a vast array of literature exists highlighting the effectiveness of different plants from this species in addressing pharmacological disorders and health issues [2]. This plant serves as both a medicinal and decorative species, with its roots and leaves utilized in treating fevers. It has been extensively introduced beyond its original habitat and is deemed invasive in some tropical island regions

Plant description:

A. indicum is a lasting shrub, gently hairy and reaching up to 3 meters in height. The leaves are persistent, base-cordate, stipulate, filamentous, ovate, acuminate, serrated, occasionally subtrilobate, and measure 1.9-2.5 cm in length. Petiole 1.5-1.70cm in length, cylindrical, with a yellowish hue, star-shaped, and hairy. The flowers have a yellow hue, with the peduncle jointed above the center. The petioles measure 3.8-7.5 cm in length; stipules are 9 mm long; pedicels typically range from 2.5-5 mm, solitary in axils, jointed just below the apex, and the seeds are 3-5 mm, kidney-shaped, reniform, tuberculate or finely stellate-hairy, black or dark brown. *A. indicum* has been utilized as anthelmintic, antiemetic, anti-inflammatory, for urinary or uterine

secretion, hemorrhoids, and as an antidote. It is utilized in the treatment of fever, dry cough, bronchitis, gonorrhea, and leprosy.

Table 1: Description of *A. indicum* Plant [1].

Picture	Parts	Description
	Flower	Flowers are yellow, the peduncle is joined above the middle. The petioles 3.8-7.5 cm long; stipules 9 mm long; pedicels often 2.5-5 mm long, calyx 12.8 mm long, divided in to the middle, lobes ovate, apiculate and corolla 2.5 cm diameter.
	Seed & Fruit	Fruits are capsule, densely pubescent, with conspicuous and horizontally spreading beaks & seeds are 3-5 mm, reniform, tubercled or minutely stellate-hairy, black or dark brown
	Stem & Leaves	The stems are stout, branched, 1-2 m tall, and pubescent & Leaves are ovate, acuminate, toothed, rarely subtrilobate and 1.9-2.5 cm long

Distribution:

The species is found in various tropical and subtropical regions and climates. The plant occurs in India, Sri Lanka, tropical areas of America and Malaysia. It is regarded as a weed in sub-Himalayan regions, on hills up to 1200m, and in the warmer

areas of India. An instance can be found in sections of the 'Great Barrier Reef' islands of the 'Coral Sea' [3].

Taxonomical classification:

Kingdom	:	Plantae
Clade	:	Tracheophytes
Clade	:	Angiosperms
Clade	:	Eudicots
Clade	:	Rosids
Order	:	Malvales
Family	:	Malvaceae
Genus	:	Abutilon
Species	:	<i>A. indicum</i>

Bengali	:	Petari
Malayalam	:	Dabi, Uram, Vellula
Guajarati	:	Khapat, Kansi, Dabli
Marathi	:	Mudra, Petari
Arabian	:	Masthul Gola
Kannada	:	Tutti
Farsi	:	Darakhtashaan

Common Name: Abutilon, Indian mallow

Vernacular names of *Abutilon indicum*:

Tamil	:	Tutti, Paniara, Hutti
Hindi	:	Kanghi, Kakahi
Telugu	:	Utturu benda
	:	Duvvenakaya, Duvvena Kayalu
English	:	Country mallow, Indian mallow

PHYTOCHEMISTRY:

Various researchers have examined *A. indicum* phytochemically and discovered it contains several chemical constituents.

Table 2: Phyto constituents of *A. indicum* [1].

Plant Parts	Phyto constituents of <i>A. indicum</i>
Whole plant	The entire plant has mucilaginous compounds, asparagines, saponins, flavonoids, alkaloids, hexoses, and n-alkane blends. Key components found in the plant include β -sitosterol, vanillic acid, p-coumaric acid, caffeic acid, fumaric acid, Abutilon A, (R)-N-(1'-methoxycarbonyl-2'-phenylethyl)-4-hydroxybenzamide, hydroxybenzoic, galacturonic, β -D-glycosyloxybenzoic and amino acids. The plant <i>A. indicum</i> possesses essential oil primarily composed of α -pinene, caryophyllene, caryophyllene oxide, endesmol, farnesol, borneol, geraniol, geranyl acetate, element, and α -cineole.
Roots	Non-drying oil derived from the roots contains a variety of fatty acids, including linoleic, oleic, stearic, palmitic, lauric, myristic, caprylic, capric, and a rare fatty acid with a C17 carbon structure, along with sitosterol and amylin obtained from unsaponifiable substances.
Leaves	The plant's leaves have carbohydrates, steroids, sapogenins, and flavonoids. Eudesmic acid, ferulic acid, and caffeic acid were extracted from the methanol leaf extract, while fatty acids and esters were identified in the ethanolic leaf extract.
Flowers	Seven flavonoid compounds—luteolin, chrysoeriol, luteolin 7-O-beta-glucopyranoside, chrysoeriol 7-O-beta-glucopyranoside, apigenin 7-O-beta-glucopyranoside, quercetin 3-O-beta-glucopyranoside, and quercetin 3-O-alpha-rhamnopyranosyl (1 --> 6)-beta-glucopyranoside—were extracted and characterized from the flowers. Two sesquiterpene lactones, namely alantolactone and isoalantolactone, have been documented.
Fruits	Fruits contain flavonoids and alkaloids
Seeds	A galactomannan that dissolves in water has been extracted from the seeds that have -galactose and -mannose in a 2:3 molar ratio. The plant's seed oil provides cis 12, 13-epoxyoleic (vernolic) acid, 9, 10-methylene octadec-9-enoic (sterculic) acid, and 8, 9-methylene-heptadec-8-enoic (malvalic) acid. Seed oil showed a significant presence of unsaturated fatty acids. Stearic and palmitic acids, Raffinose was discovered in seeds. The amino acid composition of seed proteins (31%) includes threonine, glycine, serine, glutamine, lysine, methionine, isoleucine, proline, alanine, cysteine, tyrosine, phenylalanine, leucine, asparagine, histidine, valine, and arginine.

Traditional Uses:

Almost all the parts of *A. indicum* are of medicinal importance and traditionally used for the treatment of various ailments.

Table 3: Traditional Uses of *A. indicum* [4].

Parts	Traditional uses
Roots	Demulsant, diuretic, in chest infection and urethritis.
Infusion of the root	Prescribed in fevers as a cooling medicine and is considered useful in strngury, haematuria and in leprosy.
Leaves	Ulcer and as a fomentation to painful parts of body.
Decoction of the leaves	Toothache, tender gums and internally for inflammation of bladder.
Bark	Febrifuge, anthelmintic, alexeteric, astringent and diuretic.
Seeds	Piles, laxatives, expectorants, in chronic cysticis, gleet and gonorrhea

Ethanobotanical Uses:

India is home to more than 400 distinct tribal and ethnic groups. Every tribal community possesses its own traditions, vernaculars, beliefs, and knowledge regarding the use of natural resources as medicinal aids. Nearly all the components of this plant are recorded as beneficial in ethnobotanical studies carried out by

ethnobotanists. Records indicate that indigenous people from India, Malaya, the Philippine Islands, and Indochina utilize its components for medicinal uses like fever reduction, worm expulsion, nausea prevention, inflammation reduction, urinary or uterine discharge issues, hemorrhoids, and lower back pain [4].

Table 4: Ethanobotanical Uses of *A. indicum*

Parts	Ethanobotanical uses
Leaf	<ol style="list-style-type: none"> 1. The seeds and leaves are ground with water to create a paste that is applied to the penis to treat syphilis. 2. The leaves are utilized in eye rinse, mouth rinse, for cataracts, and diarrhea. 3. A paste made from leaves is consumed to treat hemorrhoids and alleviate leg pain. 4. The bread made from a blend of leaf powder and wheat flour is consumed each night for roughly a month to treat uterus displacement. 5. The juice of the leaf, when combined with jiggery, is employed in treating snakebites as an antidote [5].
Fruit	<ol style="list-style-type: none"> 1. The fruit is utilized for treating piles, gonorrhea, and cough. 2. A mixture of fruit decoction and ammonium chloride is administered orally with water for the treatment of hemorrhagic septicaemia.[6].
Seed	Seed powder is used orally with water as aphrodisiac and laxative.
Root	<ol style="list-style-type: none"> 1. The plant's root is used for treating gonorrhea and leprosy. 2. Root infusion is administered to treat fever, dry cough, and bronchitis [7].

Pharmacological activities:**Table 5: Pharmacological activities of *A. indicum***

S.No	Diseases	Activity
01	Hepatoprotective:	The water extract of <i>A. indicum</i> was evaluated for its hepatoprotective effects against hepatotoxicities caused by carbon tetrachloride and paracetamol in rats. The plant showed notable hepatoprotective effects by mitigating changes in biological parameters induced by carbon-tetrachloride and paracetamol, which was clear through enzymatic analysis. The extract from the plant might disrupt free radical production, potentially resulting in liver-protective effects. <i>A. indicum</i> demonstrated significant hepatoprotective effects against carbon tetrachloride and paracetamol, comparable to the standard silymarin [8].

02	Hypoglycemic activity:	The alcohol and water extracts of <i>A. indicum</i> leaves (400mg/kg, p.o.) demonstrate a notable hypoglycemic effect in normal rats four hours post-administration (23.10% and 26.95% respectively). The aqueous extract was also shown to be highly effective in lowering blood glucose levels. [9].
03	Immunomodulatory activity:	The entire powdered form of the plant at a dosage of 500mg/kg body weight indicated a statistically significant increase in modulatory behavior across all models when compared to the control group (9)
04	Analgesic activity:	Pet ether and benzene extracts demonstrated significant analgesic properties. The plant's fixed oil demonstrates strong analgesic properties when administered in doses of 400 and 600mg/kg. Eugenol (4-allyl-2-methoxyphenol) extracted from <i>A. indicum</i> has been shown to have considerable analgesic effects [10].
05	Antimicrobial activity:	Extracts from <i>A. indicum</i> (fruits, roots, and leaves) exhibit no notable inhibition against the microorganisms <i>Bacillus cereus</i> var <i>mycoides</i> , <i>Bacillus pumilus</i> , <i>Bacillus subtilis</i> , <i>Bordetella bronchiseptica</i> , <i>Micrococcus luteus</i> , <i>Staphylococcus aureus</i> , <i>Staphylococcus epidermis</i> , <i>Escherichia coli</i> , <i>Klebsiella pneumonia</i> , <i>pseudomonas aeruginosa</i> , <i>Streptococcus faecalis</i> , <i>Candida albicans</i> , <i>Aspergillus niger</i> , <i>Saccharomyces cerevisia</i> . The lack of activity against the aforementioned strains indicates that the plant lacks antimicrobial properties. The examination of the seeds of <i>A. indicum</i> (L.) shows Mycelial inhibition (%) against <i>Absidia ramos</i> and <i>Aspergillus niger</i> by 6.97 and 37.25 respectively [11].
06	Antimalarial activity:	Beta-sitosterol isolated from the petrollium ether extract of leaf of <i>A. indicum</i> showed mosquito larvicidal activity [12].
07	Anti-diarrhoeal activity:	The research demonstrated that both the methanolic extract and the aqueous extract exhibited considerable anti-diarrheal effects in diarrhea induced by Castor oil and prostaglandin E2, in comparison to the control group [13].
08	Anti estrogenic activity	The methanolic extracts of <i>A. indicum</i> exhibit an anti-estrogenic impact on uterotrophic and uterine peroxidase functions in ovariectomized rats. This extract was identified to result in considerable inhibition of enzyme activity and the uterotrophic response triggered by estradiol, while in the group not exposed to estradiol, a slight increase in peroxidase activity was noted [14].
09	In vitro anti arthritic activity	An extract of <i>A. indicum</i> (Linn.) that is soluble in water was examined through three in vitro parameters: protein denaturation, membrane stabilization, and protease inhibition. <i>A. indicum</i> at dosages of 100 and 250 mcg/ml offered considerable protection from protein denaturation and damage to RBC membranes caused by hypotonic saline. It also showed notable anti-protease activity [16].
10	Diuretic activity	Seed extract of <i>A. indicum</i> (200 and 400 mg/kg) was assessed for its diuretic properties. The extract at dosages of 200 and 400 mg/kg resulted in a notable dose-dependent rise in urinary excretion and sodium loss, but it did not impact the intrinsic potassium-sparing effect [15].
11	Anticancer activity	Srikanth P et al selected medicinal plants, specifically <i>A. indicum</i> and <i>Blumea mollis</i> , to evaluate their potential anti-oxidant properties and cytotoxic effects. The extract was also evaluated for its antioxidant activity via FRAP, 1, 1-Diphenyl-2-picrylhydrazyl [DPPH] radical scavenging, and Nitric Oxide radical inhibition assessed through the Griess Illosvoy reaction with minor modifications. These extracts demonstrate antioxidant qualities and a suppressive effect on cancer cells with higher concentration and extended duration [13].

12	Anti convulsant activity	Golwala et al. investigated the anticonvulsant properties of <i>A. indicum</i> leaf extracts. The ethanolic extract was observed to enhance the onset of clonic convulsions while reducing the onset of tonic seizures, demonstrating a notable anticonvulsant effect. The water extracts demonstrated a notable protective effect by prolonging the onset of clonic convulsion time and reducing extensor time in comparison to the control group. The anticonvulsant effect was ascribed to linoleic acid and/or flavonoid components found in the extracts [17].
13	Larvicidal activity	The toxicity of crude hexane, ethyl acetate, petroleum ether, acetone, and methanolic extracts of <i>A. indicum</i> was evaluated for their larvicidal activity. All extracts demonstrated moderate effects on larvae. However, the greatest larval mortality was observed in the petroleum ether extract. Additionally, the identification of β -sitosterol as a potential novel mosquito larvicidal agent was verified through ¹ H NMR, ¹³ C NMR, and mass spectrometry data, showing an LC50 value of 26.67 ppm against <i>C. quinquefasciatus</i> [18].
14	Wound healing activity	[18] assessed the wound healing properties of <i>A. indicum</i> Linn. There was a notable rise in the rate of wound closure. All the extracts were collected for phytochemical analysis. The gradual alterations in the wound area were observed by outlining the wound edge daily. The findings indicate that the petroleum ether extract of " <i>A. indicum</i> " Linn exhibited more effective wound healing activity compared to the ethanol extract [19].
15	Anti asthmatic activity	This research highlighted the efficacy of powder from the dried aerial components of <i>A. indicum</i> in reducing the intensity of typical symptoms associated with bronchial asthma, such as dyspnoea, cough, chest tightness, and wheezing. It was also observed to notably enhance pulmonary function assessed by forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and peak expiratory flow rate (PEFR) in individuals with mild to moderate bronchial asthma [20].

CONCLUSION

A. indicum possesses multiple pharmacological properties, including Hepatoprotective effects, Hypoglycemic effects, Immunomodulatory effects, Analgesic effects, Anti-microbial effects, Anti-malarial effects, Anti-Diarrhoeal effects, Anti-Estrogenic effects, Wound Healing effects, In Vitro Anti-Arthritic effects, Diuretic effects, Anti-Cancer effects, Anti-Convulsant effects, Larvicidal effects, and Anti-Asthmatic effects. The primary chemical components include carbohydrates, steroids, glycosides, flavonoids, tannins, and phenolic substances. This review article has aimed to gather and compile information on *A. indicum*, which will be beneficial for society to explore alternative medical systems.

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