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## Ethnomedicinal uses and phytochemistry of *Abutilon indicum* (Linn.) Sweet: an overview

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**Abstract**

*Abutilon indicum* is one of the renowned plant species used to treat a large number of human ailments. The whole plant or its specific parts (leaves, stem, roots, fruits and seeds) are known to have medicinal properties and have a long history of use by indigenous and tribal people in India. Traditionally, the plant is used for treatment of inflammation, piles, gonorrhoea and as an immune stimulant. In general, its root and bark are used as aphrodisiac, anti-diabetic and diuretic. Seeds are used in the treatment of cough, urinary disorders and as a laxative in piles. More importantly, the juice from its leaves has been used to formulate an ointment for quick ulcer healing properties. Besides, it is widely used in folk medicine for treating fever, cough, lung disease, urine output, deafness, ringing in the ears, mumps and pulmonary tuberculosis. Some important essential oil constituents like  $\alpha$ -pinene, caryophyllene, caryophyllene oxide, endesmol, farnesol, borenol, geraniol, geranyl acetate, elemene and  $\alpha$ -cineole have been reported from plant. Phytoconstituents like  $\beta$ -Sitosterol, caffeic acid, fumaric acid, vanillin, p-coumaric acid, p-hydroxybenzoic acid, sesquiterpene including lactones, alantolactone and isosalantolactone have also been reported from different part of the plant. The present paper highlights evidence-based overview of phytochemical and ethnomedicinal properties of *A. indicum*, which may be helpful to establish a standard natural drugs for further research.

**Keywords:** *Abutilon indicum*, antidiabetic, ethnomedicine, folk medicine, phytochemistry.

**1. Introduction**

Plants have been used as medicines for thousands of years. People depend on plants for several purposes like for wood, timber, non-timber forest products, food, medicine etc. [1]. They have always been used as a rich source of biologically active drugs and have numerous traditional uses to serve mankind for many thousand years [2-7]. Now days, they are used widely because of growing awareness of people towards unwanted side effects and high cost of the allopathic medicines [8-9] which makes them beyond the reach of common people. According to WHO (World Health Organization) report, about 80% of the population, mostly in developing countries still depends on traditional medicinal system for their primary health care. India is one of the twelve mega-biodiversity centers with 4 hot-spots of biodiversity. Ethnobotanical knowledge has been reported from its several parts [10-13]. The different systems of medicinal usage like Ayurveda, homeopathy and Unani which are the local health traditions, focuses on the use of plant products for the treatment of human and animal diseases. Medicinal plants contain numerous biologically active compounds which are helpful in the treatment of various diseases and improving the life. The presence of various life sustaining constituents in plants made scientists to investigate them for their uses in treating certain infectious diseases and management of chronic wounds. In addition to being a good source of anti-infective agents, they are also cost-effective and have fewer side effects [14-17].

The information on medicinal plants has been accumulated in the course of several centuries based on various systems of medicine. India has very rich plant diversity and houses about 47,000 plant species but traditional healers' uses only 2500 plant species out of which about 100 species of plants serve as natural principles source of medicine [18]. A large number of plants still remain unexplored with regard to their medicinal properties and they can also be sources of potentially active compounds for the development of new drugs to treat various diseases. The present review is on *Abutilon indicum* (Linn.) Sweet, it is commonly called as 'Country mallow' in English and 'Kanghi' in Hindi. A systematic scientific study has been conducted regarding the efficacy of different plant parts in the treatment of various diseases. There is a need to review the information available in literature on *Abutilon indicum* to answer the gaps between ethnomedicinal uses and phytochemical studies, so that it would aid future research by phytochemists, pharmacologists, clinicians, researchers, scientists and toxicologists.

The information collected has been compiled and made easily available at one place in the interest of the scientific community.

## 2. Botany of plant

### 2.1. Distribution

The *abutilon* genus of the Malvaceae family comprises approximately 150 plant species; those are widely distributed in tropical and subtropical countries of Asia, Africa, Australia and America. *Abutilon indicum* is a hairy herb or under shrub found in the outer Himalayan tracts from Jammu to Bhutan up to an altitude of 1500 m and extending through the whole of northern and central India. It can grow in dry and poor soil and require hot conditions. In India it is very common on roadsides and waste places generally to grow after the rainy season.

### 2.2. Taxonomic status <sup>[19-20]</sup>

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Dilleniidae
Order	:	Malvales
Family	:	Malvaceae
Genus	:	<i>Abutilon</i>
Species	:	<i>indicum</i>

### 2.3. Vernacular names <sup>[21-22]</sup>

Hindi	:	Jhampi, Kandhi, Kangahi, Kangai, Kanghani, Kanghi, Kanghi-ka-pat, Tepari
English	:	Country mallow
Sanskrit	:	Atibala, Bala, Balika, Balya, Bhuribala, Ghanta, Kankati, Kankatika, Mahabala, Pitapuspa, Rishiprokta, Shita, Shitapushpa, Vatyapushpika, Vikankata, Vrishyagandha,
Arabic	:	Deishar, Mashtul-gh-oul, Mashtulghola, Mashtulghou, Mast-ul-ghoul
Kannada	:	Baralu kaddi, Giduthingi, Gidutingi, Haagade, Hettukisu, Tutti, Kisangi gida, Hetthukisu, Mudre gida, Hetthutthi, Hettutti, Srimudre gida, Srimudrigida, Tutti gida, Srimudre, Thurubee gida, Thuthi gida, Shrimudrigida
Malayalam	:	Beloeren, Katturam, Katturan, Kuruntotti, Pettaka, Pettaka-putti, Pitikkapattu, Tutti, Tuvatti, Uram, Velluram
Marathi	:	Akakai, Kangain, Kansuli, Karandi, Madmi,

Tamil	:	Mudra, Mudrika, Petari, Pidari, Pitari, Duddi, Nallatutti, Pamyarattutti, Paniyarattuti, Perun-tutti, Perundutti, Peruntutti, Thuthi, Thuththi, Tutti, Ventutti
Telugu	:	Adavi benda, Adavibenda, Botiabenda, Botla benda, Doodi, Doodi chettu, Dudi, Erri benda, Erribenda, Kamalaku, Muttavashirubenda, Noogubenda, Nugu-benda, Thuthi, Thuthura benda, Thutirichettu, Thutthi, Thutthurubenda, Tutiri-chettu, Tutti, Tutturu-benda
Urdu	:	Kanghi

### 2.4. Plant Description

*Abutilon indicum* is herbaceous weed and found abundantly in wastelands. The stem of the plant is stout, branched, about 1-2 m tall and 0.3-0.9 cm in diameter. The stem of the plant is yellow and often found tinged with purple colour. The leaves are ovate, acuminate, toothed, rarely subtrilobate and 1.9-2.5 cm long. The flowers are yellow in colour, peduncle jointed above the middle. The petioles 3.8-7.5 cm long; stipules 9 mm long and pedicels often 2.5-5 mm long. They are axillary solitary, jointed very near the top; calyx 12.8 mm long, lobes ovate, apiculate and corolla 2.5 cm in diameter, yellow and open. The fruits are capsule, densely pubescent, with conspicuous and horizontally spreading beaks. The seeds are 3-5 mm in size, reniform, tubercled or minutely stellate-hairy, black or dark brown <sup>[23-26]</sup>. The root of the plant is with smooth surface, cylindrical, 1.2 to 1.5 cm in diameter, fragrant, salty taste and yellow in colour.

### 3. Scope of Review

The review of *Abutilon indicum* is predominantly needed to answer the gaps between ethnomedicinal uses and phytochemical studies. An attempt has been made to provide the complete information on ethnomedicinal uses and phytochemistry of the plant, so that it would aid in future research on this species by phytochemists, pharmacologists, scientists, researchers and toxicologists etc. The review highlighted the ethnobotanical uses (Table1) and phytochemicals isolated (Fig-1-2) from various parts of the plant to provide a comprehensive idea to the readers.

### 4. Ethnomedicinal Uses

*Abutilon indicum* is one of the plant species with potential medicinal properties. The whole plant and different parts of the plant are used to cure many human ailments. It is an Asian phytomedicine plant and it has anti-diabetic and anti-bacterial activities <sup>[27]</sup>. The paste of leaves and seeds is applied to penis to cure syphilis <sup>[28-30]</sup>. It is reported that the dried aerial parts are used decreasing the symptoms of bronchial asthma as it increases pulmonary function in patient. The leaf paste is also taken orally to relieve body pain and to cure piles <sup>[31]</sup>. The fruit decoction mixed with ammonium chloride is used against haemorrhagic septicaemia <sup>[32]</sup>. It is found that the aqueous and ethanolic extract of the plant leaves has immunomodulatory

activities as it showed an increase in the production of circulating antibody titers in blood [33]. The leaf extract of *Abutilon indicum* has shown good response on human

Caucasian lung carcinoma [34]. The leaf extract of the plant also has anti-venom potential [35]. The ethnomedical profile is given in Table 1.

**Table 1:** Ethnomedicinal profile of *Abutilon indicum*

S. No.	Plant part used	Ethnomedicinal uses	References
1.	Roots	To treat Fevers Chest infection Gonorrhoea Haematuria Strangury Leprosy Dry cough Bronchitis Gout Polyuria Uterine hemorrhagic discharge Urinary discharge Urethritis	       36 36 36 36 36
2.	Stem Bark	Used as Febrifuge Anthelmintic, Alexeteric, Astringent Diuretic Aphrodisiac Laxative	      13 13
3.	Leaves	To cure Ulcer Inflammation Rheumatism Syphilis of penis Piles and to relieve leg pains Uterus displacement Inflammation of bladder Catarrhal bilious diarrhea Bronchitis Gonorrhoea Fevers  Used as Fomentation to painful parts of the body Antidote for the treatment of snakebite  Used in Toothache, tender gums lumbago Ear-ache Catarrh and bilious diarrhea  Used for Eye wash Mouth washes	   1,9,37 10 11 38 38 38 38 38  12  10  10 10
4.	Fruits	To treat Piles Gonorrhoea Cough Haemorrhagic septicemia	  14-15 14-15 14-15 39
5	Seeds	To treat Chest problems Bronchitis Piles Chronic cystitis Gleet Gonorrhoea	   40-41 40-41 40-41

		Rectum of children affected with thread worms	40-41 42
		Used as	
		Tonic	19-20
		Expectorant	19-20
		Laxative	13
		Aphrodisiac	13
		Emollient	42
		Demulcent	42

### 5. Phytochemistry

The phytochemical screening of various extracts of *Abutilon indicum* showed the presence of alkaloids, glycosides, carbohydrates, tannins, phenolic compounds, proteins, amino acids, saponins, flavonoids, terpenoids, gums and mucilages [43] (Table-2). Hussain *et al.* [44] give the quantitative estimation of two biologically active steroid compounds from the plant, including stigmasterol triterpenoid and luepol using high performance liquid chromatography (HPTLC). Many important phytoconstituents like  $\beta$ -Sitosterol and tocopherol were isolated from the plant [45-46]. The plant essential oil constituents mainly of  $\alpha$ -pinene, caryophyllene, caryophyllene oxide, endesmol, farnesol, borenol, geraniol, geranyl acetate, elemene and  $\alpha$ -cineole (Fig-1) along with number of many other minor constituents [47].

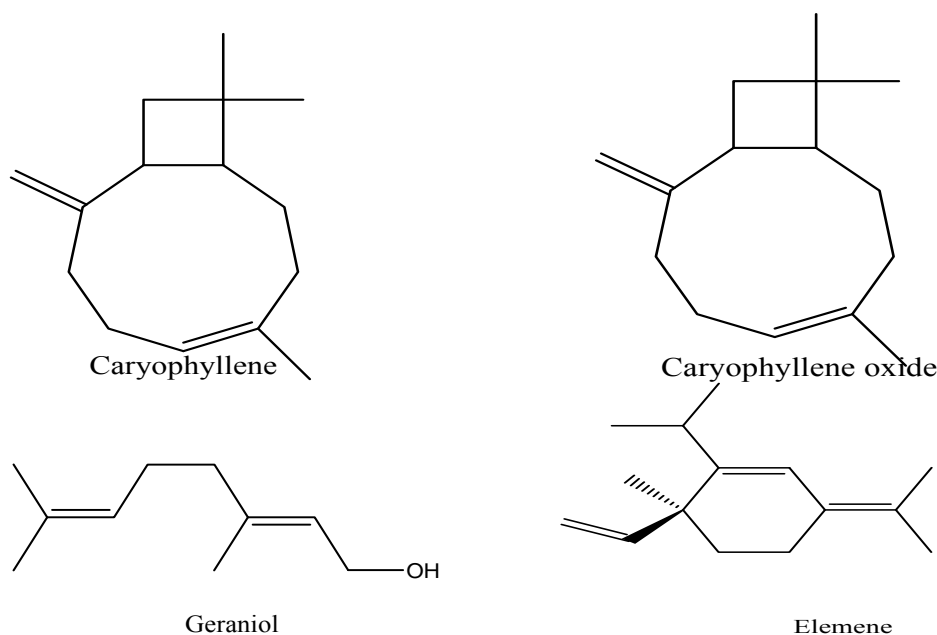
The plant was found to contain some amino acids like leucine, histidine, threonine, serine, glutamic acid and aspartic acid and carbohydrate (p- $\beta$ -Dglucosycoxybenzoic acid, glucovanilloyl glucose, fructose, galactose, glucose) [45]. The plant is a very rich source of fatty acids like linoleic acid, palmitic acid, oleic acid, stearic acid etc.

Other chemical compounds like caffeic acid and fumaric acid, vanillin, p-coumaric acid, p-hydroxybenzoic acid, sesquiterpene including lactones alantolactone and isovalanto-lactone are also reported [48] (Fig. 2). It also contains flavonoids like luteolin, chrysoeriol, luteolin-7-O- $\beta$  gluco pyranoside, chrysoeriol 7-O- $\beta$  gluco pyranoside, apigenin 7-O- $\beta$ -gluco pyranoside, Quercetin 3-O- $\beta$ -gluco pyranoside, Quercetin 3-O- $\alpha$  rhamnopyranosyl,  $\beta$ -gluco pyranoside [49].

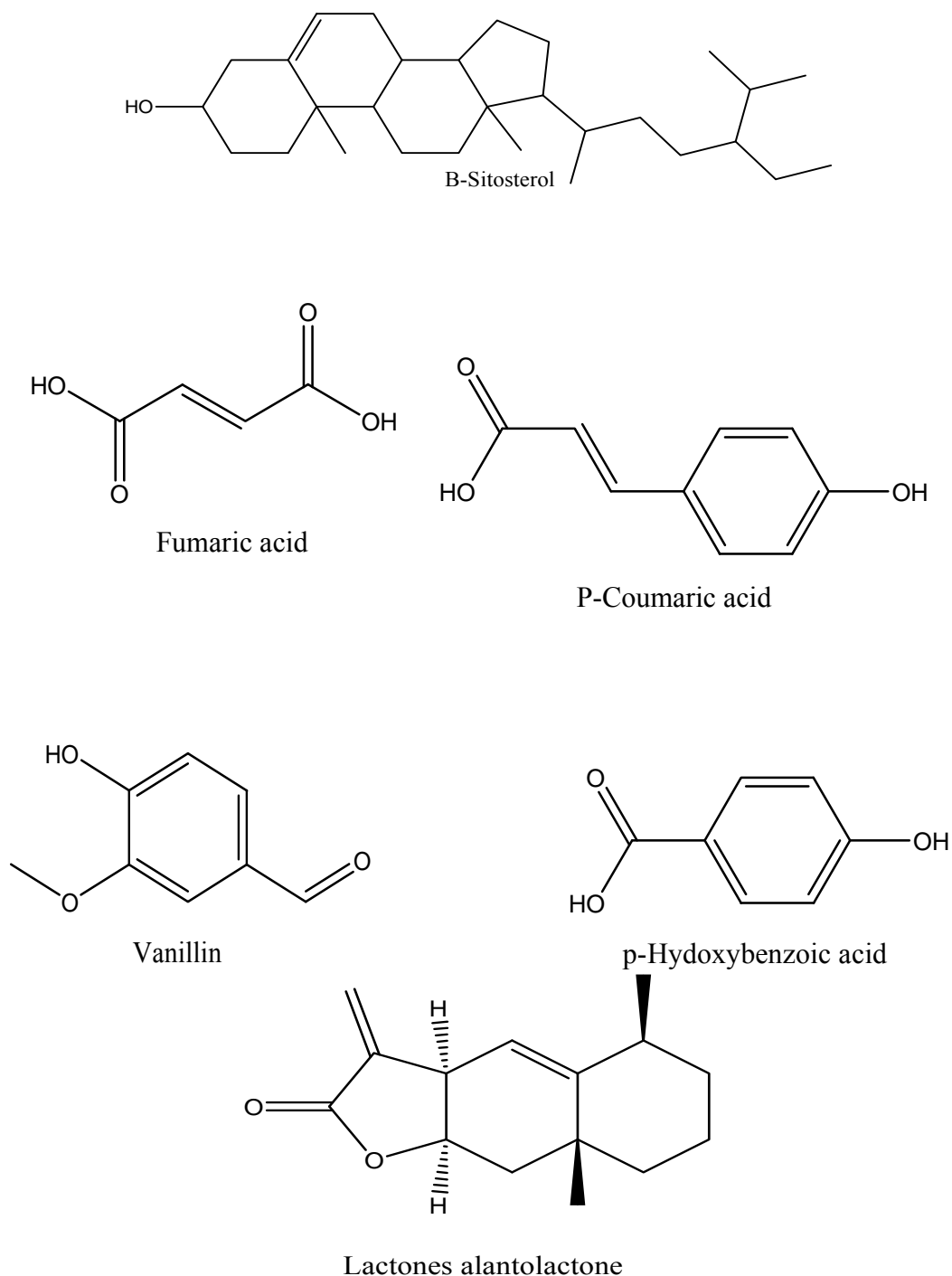
**Table 2:** Qualitative phytochemical profile of *Abutilon indicum*

Extract	Solvent	Alkaloids	Carbohydrate	Flavanoids	Glycosides	Phenols	Saponins	Steroids	Sterols	References
Leaf	Petroleum ether	-	-	+	+	+	+	+	+	50
	Ethyl acetate	+	+	-	-	+	-	-	-	
	Chloroform	+	+	+	+	+	-	-	+	
	Methanolic	+	+	+	+	+	+	+	+	
	Aqueous	-	+	-	+	-	+	+	+	
Stem	Hydro-alcoholic	-	+	+	-	+	-	+	-	51
	Methanolic	-	+	+	+	+	-	-	-	
	Aqueous	-	+	+	+	+	-	+	-	

(+) Indicate presence of phytochemicals and (-) indicate absence of phytochemicals



**Fig 1:** Structure of some important essential oil constituents reported from *Abutilon indicum*



**Fig 2:** Structure of some important phytoconstituents of *Abutilon indicum*

## 6. Conclusion

Based on numerous therapeutic properties in traditional medicinal system, it can be concluded that the plant *Abutilon indicum* is a valuable medicinal herb. The leaves and seeds of plant are most commonly used as ethnomedicine. The plant contains several remarkable biologically active compounds like  $\beta$ -Sitosterol, tocopherol oil, caffeic acid, fumaric acid, vanillin, p-coumaric acid, p-hydroxybenzoic acid, sesquiterpene (lactones alantolactone and isoalanto-lactone) and many constituents of essential oils like  $\alpha$ -pinene, caryophyllene, caryophyllene oxide etc. Numerous studies have been conducted in different parts of *A. indicum* but the plant has not been yet developed as a drug by pharmaceutical

industries. A detailed and systematic study is required for identification, cataloguing and documentation of plants, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. In view of the nature of the plant, more research work should be carried out so that drugs with multifarious effects would be available in the future.

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