Review Article

A brief review on Pharmacological properties of *Abutilon indicum* roots

A. M. Krupanidhi*, Prakash Dabadi, Chandana M., Mythree M.V., Pooja H. S., Pooja J. U., Sushma S., Sushruta K. H.

Department of Pharmacology Bapuji Pharmacy College, S.S layout Davangere, 577004, Rajiv Gandhi University of Health Science –Karnataka, India

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Abstract

India is emporium of medicinal plants and every citizen of Indians must gain the knowledge. Objective of the present was focused on investigation of importance and therapeutic value of traditional plant as well as its phytoconstituents for various ailments. The active constituents of the various plants consisting many number of secondary metabolites have showed clinical importance which was not cured by synthetic analogues. After the GATT implementation in India many of pharmaceutical companies are come forwarded to establish various synthetic active moieties using lead compound of plant isolated moieties. *Abutilon indicum* is belonging to family Malvaceae and also known as Abelmoschus Mallow. It is used as medicinal plant containing active constituents like saponin, flavonoids, terpenoids amyrin, steroids, alkanol, amino acids, hexoses, β-sitosterorls, palmitic acid. The various parts of *Abutilon indicum* exhibits excellent biological activities like antiemetic, anti-inflammatory, anthelmintic, antioxidant and nephroprotective.

***Keywords*:** *Abutilon indicum*, flavonoid, amyrin, antioxidant property, neuroprotective

Introduction

Medicinal plants are nature's gift to human species (Sharma *et al*., 2013) through local customs and knowledge they have been collected, consumed and managed. The Indian about 17% of rural people were depending on herbal medicines due to medicinal plants are abundantly available in local areas. Moreover, people have knowledge of traditional medicinal value. Based on these evidences the present study was focused on review of Medicinal plant of *Abutilon indicum* (L).

Medicinal plants enable them to live healthy and disease free (Sharma *et al*., 2013) because of presence of natural compounds. And they are major source of molecules with medicinal properties. People rely on plants for a variety of things including food, wood and medicines that have been used for thousands of years (Venkat *et al*., 2020).

Botanically, Indian medicinal plant *Abutilon indicum* sweet also known as Indian mallow in English and atibala in Hindi (Venkat *et al*., 2020), Dabi and uram in Malayalam, Tuturubendra in Telugu, Is used in Ayurveda. It belongs to the family *malvaceae* (Sharma *et al*., 2013).

It is Perennial herb, shrub and even small tree (Sharma *et al*., 2013). It is prevalent across the tropics, subtropics and Ceylon and Sub Himalayan tract and in India high up to 1200m (Gaikwad *et al*., 2011). But it is especially common in India at road side, and in hotter regions. The plant includes whole 75 genera and 1000 of species. The family is represented in India by 22 genera and roughly 110Species (Venkat *et al.,* 2020).

During 1000 BC, the extract of the entire plant was used in prescriptions for loss of vitality, fever and rheumatic conditions (Charaka). During Sushruta's period thick aqueous decoction, as an ingredient of a massage cream, was used for promoting growth of normal healthy tissue after surgery. Charaka and Sushruta both used the drug as a rasayana (aphrodisiac). The powdered herb was used during the 16th century for menometrorrhagia (Bhaavaprakaasha) (Kare, 2007).

Abutilon indicun contains variety of antioxidant and phenolic compounds (tannins, alkaloids, Para coumaric acid saponin,

Address for Corresponding Author:
Dr. A. M. Krupanidhi
Department of Pharmacology Bapuji Pharmacy College, S.S layout Davangere, 577004, Rajiv Gandhi University of Health Science, Karnataka, India
E-mail: dramkrupanidhi@gmail.com

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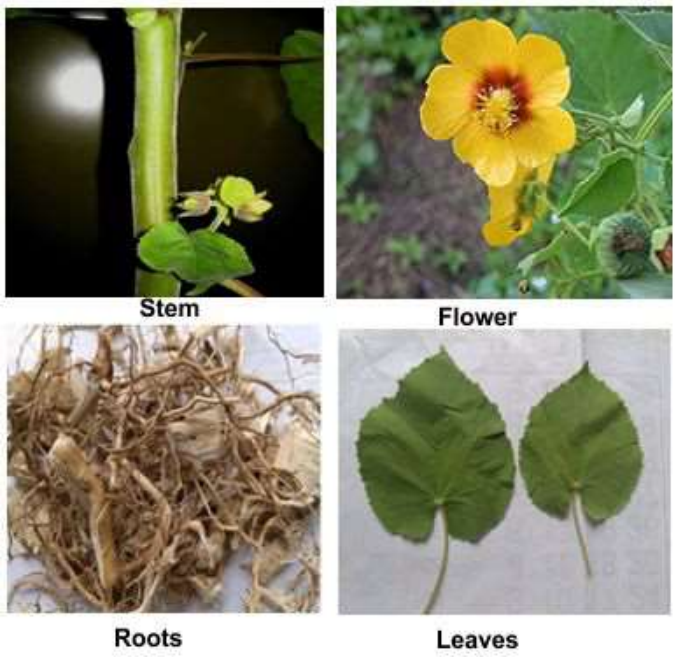

Figure 1. Different parts of *Abutilon indicum*

flavonoids, alkaloids, hexoses, n-alkane mixtures, alkanol amino acids (Mohite *et al*., 2012) mainly root contains steroids, terpenoids, proteins, carbohydrates (Nithyatharani *et al*.,2018), amyrin (Sharma *et al*., 2013).

The plant contains gallic acid. Showed analgesic action in albino rats. The leave contains 11.5 % asparagine.

The plant is reported to contain fructose, galac tose, glucose. beta-sitosterol, vanillic acid, p-hydroxybenzoic acid, caffeic acid, fumaric acid, p-beta-D-glycosyloxybenzoic acid, leucine, histidine, threonine, serine, glutamic acid, aspar tic acid and galacturonic acid.The plant also contains two (new) sesquiterpene lactones, alantolactone and isoalantolactone. Pres ence of leucoanthocyanins, sterols and cardiac gluco sides is also reported (Khare, 2007).

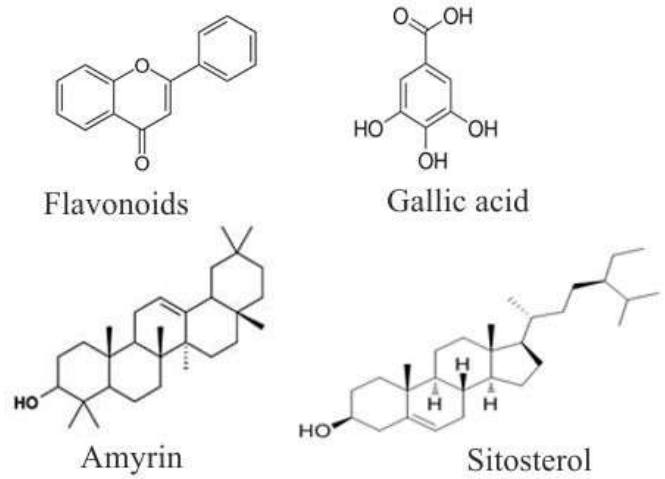

Figure 2. Chemical constituents of *Abutilon indicum* roots

Abutilon indicum mainly uses as anthelmintic, antiemetic, anti-inflammatory, in urinary, analgesic (Mohite *et al*., 2012). Infusion of root is used in leprosy, haematuria (Sharma *et al*., 2013), ACE inhibitor, nephroprotective, cardioprotective (Abat *et al*., 2017). The root is used in an ointment for boils and abscesses and in a mouthwash for inflammation (Khare, 2007).

Dried, whole plant febrifuge, demulcent, diuretic, (uterine discharges, piles, lumbago). Juice of the plant emollient. Seeds-demulcent (used in cough, chronic cystitis), laxative. Leaves-cooked and eaten for bleeding piles. Flowers antibacterial. Bark-astringent, diuretic. Root used as nervine tonic, given in paralysis; also prescribed in strangury (Khare, 2004). The root is antipyretic. Its decoction alleviates all types of dysuria (Khare, 2007). The root is given for neurological disorders like hemiplegia, facial paralysis, sciatica (Khare, 2007).

Regional names

The plant is known by various names in different languages as follows (Mohite *et al*., 2012):

Hindi name : Kangahi, Kanghi, Kanghani

Sanskrit name : Kotibala, Kankatika

English name : Country-mallow

Tamil name : Tutti, Thuththi, Peruntutti

Telgu name : Tutiri-chettu, Thuteriben

Geographical distribution

Abutilon indicum widely distributed in tropical and subtropical regions of Karnataka. Asia, Africa, and from Jammu to Bhutan up in the outer Himalayan tracts and encompassing the entire India's north and centre. It may flourish in arid, deficient soil, and require warm weather. It is highly prevalent along roadside in India.

Identification

Abutilon indicum is a herbaceous weed that grows up to 3 metres tall (Sharma *et al*., 2013) is softly tomentose, and produces seeds that are 3-5mm in size, reniform, minutely hairy, black or dark brown, and *Abutilon indicum* has ovate, acuminate toothed, and occasionally sub trilobate leaves that are 1.2 to 2.5 cm long. It has a stout, branched stem that is 1-2 m tall and 0.1to 0.9 cm in diameter. Its fruits are capsules that are densely pubescent and have conspicuous. Its flowers are yellow roots of *Abutilon indicum* have smooth- surfaced, cylindrical which is 1.2 to 1.5 Cm in diameter, fragrant, and yellow in colour (Saini *et al.,* 2014; Rajeshwari *et al.,* 2018).

Scientific classification (Mohite *et al*., 2012)**:**

Kingdom	Plantae
(Unranked)	Angiosperms
(Unranked)	Eudicots
(Unranked)	Rosids
Order	Malvales
Family	Malvaceae
Genus	Abutilon
Species	indicum

Morphological characteristics

Plants of this genus include herbs, shrubs and trees. They range in heights from about 0.5 to 3 meters. The herbage is generally hairy woolly or blistly.

Root: The root is cylindrical, true, and measures 1.2 to 1.5 cm in diameter. Smooth exterior, bright yellow colour, and potent aroma and flavourful of salt. The root is genuine, cylindrical with a smooth surface, 0.8-1.6 cm in diameter, yellowish brown in colour, strongly scented, and has a distinctive flavour. Broken bones are fibrous in nature.

The root hairs are numerous anatomical studies of the root of the *Abutilon indicum* Linn. Revealed the presence of cork that is about 6 layers thick, thin-walled, and polygonal in shape. Tabular cells; parenchymatous structure of the cortex; Medullary rays are radially parenchymatous, 2-3 layered structures. Elongated cells; significantly longer fibres make up the phloem, Xylem is present as lignified tissue that alternates with sieve tissue. Consist of Xylem fibres.

Stem-bark: Stem is yellow in colour the stem is soft and flexible, a diameter of between 0.3 and 0.9 cm. Both sides of the longitudinal surface are yellow and smooth. with a white centre. The bark's origin is epidermal, and it is 0.1-0.2 cm in diameter, flattened, and hairy on the exterior and varying in colour from green to yellow, and the inner surface is smooth, ranging from green to yellow in hue. Fracture is fibrous in nature.

Leaves: Leaf is evergreen, base-cordate, stipulate, filiform, and petiole 1.5 cylindrical, 1.70 cm long, and yellowish brown in colour, Star-shaped and hairy Simple, cordate, and reticulate lamina Acute to acuminate base-cordate, crenate, dentate, surface that is hairy, minutely stellate, and dull green in colour glauceous top, glandular hairs present below, with a coriaceous feel.

Flower: The flower transcend the cup-shaped calyx, which is pubescent and velvety and has five sepals that are fused up to at least half of their length. The corolla is golden and has five circular petals that are wider than the calyx. A staminal column, which is shorter than the corolla, is formed by the countless stamens.

Seed: Seed is reniform, 2mm long, Testa is black and is finely spotted.

Fruits: The fruit is a straw-coloured, truncated globular capsule with a pointed tip that is 15 mm in diameter and is made up of approximately 20 mericarps with flattened orange wedge shapes that are 13 to 15 mm long and 3 to 4 mm wide. The three-seed mericarps split open (Sharma *et al*., 2013).

Pharmacological activities

Antifungal activity

Ethanol extract of *Abutilon indicum* root which does not exhibits antifungal activity when combined with griseofulvin by using a fungal stain that not reveals a zone of inhibition, the plants root does not exhibits antifungal activity.

Table 1. Pharmacological activities of *Abutilon indicum*

S. No	Extract of *Abutilon indicum*	Pharmacological Activity Proved	Types of animal used	References
1	Ethanolic extract of root (100mg/kg)	Cardioprotective	Male Wistar rat	Reyad-ul-ferdous *et al*., 2015
2	Ethanol extract of root	Nephroprotective	Male Wistar rat	Jacob Jesurun *et al*., 2016
3	Ethanol extract of root + Griseofulvin	Not show antifungal activity	Fungus mycelium	Saini *et al*., 2014
4	Pet. Ether extraction of root	Analgesic	Mice	Sharma et al., 2013
5	Ethanolic extract of root	Aphrodisiac	Male Wistar rat	Chakraborty *et al*., 2017
6	Acetone, water and ethanol extract of root	ACE inhibitor activity	-	Gaikwad *et al.,*
7	n-hexane, chloroform, butanol and ethyl acetate	Antioxidant activity	-	Gaikwad et al.,

The fungal stains used such as: *Penicelliium crysogenum , Microsporum gypsum, Aspergillus flavus , Fusarium sp.* (Saini *et al.,* 2014).

Analgesic activity

They successively extracted the powdered root (900 g) using solvents with progressively higher degrees of polarity: 60 to 80 degrees Celsius petroleum ether, methanol, and ethanol for 72 hours, a soxhlet apparatus By using cold, they removed Marc. 72-hour maceration to produce a water-soluble extract Acetic acid was used to study peripheral analgesic efficacy. Swiss albino mice using the induced writhing technique (20 to 30 g), whereas tail flick was used to measure central analgesic activity and the tail immersion technique. Results showed that all of the examined extracts, with the exception of methanol extract, showed animal models showed strong analgesic efficacy. The analgesic activity of the petroleum ether extract was greater. The activity could be caused by a central mechanism or because of peripheral pain-relieving systems they verified as a result. The customary use of it was observed that the isolated eugenol [4-allyl-2-methoxyphenol] from *Abutilon indicum* has strong analgesic action (Sharma *et al.,* 2013; Mohite *et al*., 2012).

Nephroprotective activity

Acute renal failure can be induced in male Wistar albino rats by using gentamicin. An oral dose of ethanol extract of *Abutilon indicum* root was administered 60 mins before the gentamicin injection. Observe animals for activity and general behaviour. Measure urine output of animals for 24 hours under halothane anesthesia blood sample were collected by retro orbital sinus puncture. Serum creatinine blood urea nitrogen, total protein, and albumins were measured in order to evaluate the renal failure. Following euthanasia kidney tissue was removed from animal and sent for histopathology testing.

The histopathological examination revealed several ruptured glomeruli, undefined proximal and distal convoluted tubules and capillary congestion has been significantly reduced when treated with extract of *Abutilon indicum* root. Due to antioxidant and phytochemical *Abutilon indicum* shows nephroprotective (Jesurum et al., 2016).

Antioxidant activity

After being extracted in n-hexane, chloroform, butanol, and ethyl acetate, the roots and aerial parts were tested for their total antioxidant capacity (TAC), and Trolox equivalent antioxidant capacity (TEAC) using 2,2′-azinobis-3-ethylbenzotiazo-line-6-sulfonic acid (ABTS) and ferric reducing anti-oxidant power (FRAP). Using the ABTS assay, n-hexane and butanol fractions had TEAC values that ranged from 3.019 to 10.5 muM. The fractions' reducing abilities were shown by the FRAP assay to be in the following order: butanol > ethyl acetate > chloroform > n-hexane, and butanol > chloroform > hexane > ethyl acetate. The T(EC50) and EC50 values were calculated using the DPPH free radical assay. It was discovered that the extracts' ability to act as antioxidants or radical scavengers is dose-dependent. One might infer from this study that plants are a powerful source of natural antioxidants (Gaikwad *et al*., 2011).

ACE inhibitor activity

In acetone, water, ethanol (96%) by 9%, 18%, 1% of the root extract of *Abutilon indicum* was establish to inhibit. ACE From the enzymatic cleavage of the chromophore-fluorophore-labeled substrate dansyltriglycine into dansylglycine and diglycine, inhibition was determined. It displays how plants are used to treat hypertension (Gaikwad *et al*., 2011).

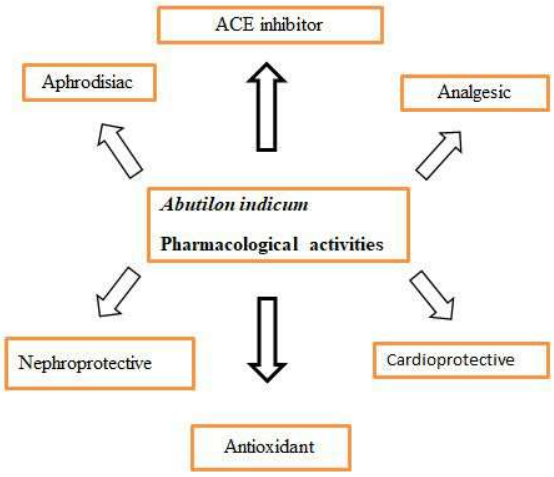

Figure 3. Reported pharmacological activities of *Abutilon indicum*

Aphrodisiac activity

The phytochemical analysis of *Abutilon indicum* provides important knowledge about the phytoconstituents found in the plant. Different qualitative chemical assays revealed the presence of terpenoids, sterols, and saponin glucose and flavonoids. An aromatic alkaloids is totally free of acid, gums, mucilage, and tannin lacking in this plant's root system. The alcoholic extract from the roots of *Abutilon indicum* L concentration (400mg per kilogramme of body weight) revealed incredibly strong aphrodisiac effects on men An rise in Wistar albino rats, as demonstrated by number of mounts, sperm, testicle-to-body ratio, and hormonal analyses count. Contrarily, Alcoholic extract at Decreased dosage and (400 mg/kg body weight) aqueous extract demonstrated a little aphrodisiac effect (Chakraborty *et al*., 2017).

Cardioprotective Activity

Male wistar Rats were tested for protection against isoproterenol induced myocardial infection using an ethanolic extract of *Abutilon indicum* root. The levels of serum enzymes such as creatinine, kinase, Lactate dehydrogenase (LDH), Aspartate transaminase (AST) and Alanine transaminase ALT) are significantly increased in the isoproterenol administered rats along with significantly elevated I lipid peroxidase. And antioxidant parameters like SOD (Super Oxide Dismutase), Catalase and glutathione peroxidase are decreases, in the heart homogenate. Daily oral pre-treatment was done for 28days using ethanolic root extract of *Abutilon indicum* (100mg/kg). Significantly reduced serum enzymes and lipid peroxidation and the levels of SOD, Catalase, GP_x are significantly elevated in heart homogenate. The ethanol extract of root *Abutilon indicum* (100mg/kg) was highly effective and safe for cardiovascular dysfunction prevention in rats. Possibly because of antioxidant qualities, however, it was found that isoproterenol-induced myocardial injury could not be reserved by an ethanolic root extract of *Abutilon indicum* (500mg/kg body wt) (Reyad-ul-ferdous*et al*., 2015).

Antimicrobial Activity

The roots of *Abutilon indicum* is do not significantly inhibit the growth of the following microorganisms*: Bacillus cereus var mycoids, Bacillus pumilus, Bacillus subtillis, Bordetella bronchiseptica, Micrococcus luteus, Staphylococcus aureus, Staphylococcus epidermis, Escherichia coli, Klebsiella pneumonia* The lack of effectiveness against the aforementioned strains demonstrates that the plant has no antibacterial activity (Shekshavati *et al.*, 2016).

Conclusion

The whole plant extract of *Abutilon indicum* shows different pharmacological activities were reported as follows, cooked and eaten for bleeding piles, antibacterial, anti-inflammatory, anti-diabetic, sedative and wound healing. The current review was focused on foremost pharmacological inspect on *abutilon indicum* root such as ACE inhibitor, Antioxidant, Nephroprotective, Antifungal and Analgesic, Cardioprotective (the extract of 100mg/kg shows activity) and Aphrodisiac. The current review gives summery of components in root contained active phytoconstitutents like Saponin, Flavonoids, Amyrin, Steroids, Amino acids and Terpenoids. In this review article, we have collected, reviewed and compiled the details research work done on *Abutilon indicum* by the researchers.

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