

Phytochemistry, pharmacognosy and pharmacological profile of *Abutilon indicum*

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ABSTRACT

Abutilon indicum belongs to the family Malvaceae is known as Indian mallow commonly. The plant was traditionally claimed to possess many medicinal properties and was used in folklore and traditional systems of medicine like Ayurveda. It contains various chemical constituents like flavonoids, phenols, sterols, tannins etc. and was scientifically investigated for many activities like an immune stimulant, diuresis, anti-epileptic, anti-ulcer and anti-parasitic activities. This article reviews the research work that was performed on the plant to publish its phytochemistry, Pharmacognosy and Pharmacological profile of the plant.



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INTRODUCTION

Plants that have medicinal properties are considered as gifts to humanity as they serve humans with the features to cure diseases. Man had been using herbs and medicinal plants for many diseases and disorders in the traditional systems of medicine. Ayurveda uses most of the Indian medicinal plants to prepare formulations that are used to treat many acute and chronic diseases. Due to the advent of science and synthetic products, synthetic drugs overtook herbal remedies due to their fast and immediate recovery. But herbs have been proven safe

and effective cures for many diseases and have been used even now too [1].

One of such excellent herb is *abutilon*, and this paper concentrates on reviewing the phytochemical, Pharmacognostical and Pharmacological properties of the plant *Abutilon indicum*.

PLANT PROFILE

Abutilon indicum belonged to the family Malvaceae and was commonly called as Indian mallow or country mallow.

The synonym of the plant is *Sida indica* and is called in Sanskrit as Khansi, in Hindi as Kandghi, in Bengali as Petari, in Telugu as Tutturu Benda, in Tamil as Panirara and turri, in Marathi as Mudra and petari and in Malayalam as Uram. In Pharsi language it is called as Darakhtashan, in Kannada as Tutti and Arabian as Masthul gola.

The taxonomical status of the plant is

Kingdom: Plantae

Order: Malvales

Family: Malvaceae

Genus: *Abutilon*

Species: indicum

Habitat and Distribution

The plant is native to tropical countries like India, Srilanka and few other African countries. Due to the introduction, the plant also grows in subtropical countries like America and Australia but with proper care.

Morphology

The plant leaves are acuminate and ovate which are sometimes trilobed. They measure about 2 cm in length. The flowers vary from pale yellow to yellow, white colour. They are petiolate, and they measure up to 7 cm long. They contain pedicles which are 3mm long and solitary followers are joined near the top of the flower. The calyx and corolla are yellow. Capsulated fruits are pubescent, and they produce beak-like structures. The stems are strong, and the plant is about 1.5m tall. The seeds measure up to 3mm and have black or brown hairs [2].

Folklore Claims

As discussed, the plant has been used to treat many diseases and ailments. Leaves of the plant are used to treat ulcers and wounds on the body. The leaf paste is used to treat toothache and gum inflammation too. The infusion made from the roots is used to cure fever, leprosy, and chest infections. Seeds of the plant are used as laxatives and to treat gonorrhoea. The roots are used to treat diseases which affect the urinary system and also used as a demulcent. The tender bark of the plant is used as an anthelmintic agent and used to induce diuresis [3].

Pharmacological activities

Antihyperglycemic activity

The antihyperglycemic activity of the aqueous extract of the leaves was tested, and glucose absorption through the intestine and increased insulin secretion was measured. Oral glucose tolerance was tested and resulted in the reduction of glucose levels in the blood. The extracts were tested at a dose of 500mg and 1000mg/kg. The extracts caused the lowering of glucose absorption from the intestine into the bloodstream [4].

The leaf powder of the plant abutilon was extracted with ethanol and water and was tested to prove their activity in lowering the blood sugar levels in rats. The results showed that the extracts normalized the elevated blood sugar levels in just four hours of the administration, which was nearly 20-30% activity [5].

Antidiarrhoeal activity

The leaves of abutilon were investigated for the

antidiarrhoeal activity in castor oil-induced diarrhoea. And also in Pg2 induced diarrhoea in rats. The methanol and aqueous extracts were tested in both the methods showed a significant reduction in intestinal motility and inhibiting the peristaltic motility [6].

Anti-ulcer activity

The anti-ulcer activity of the plant leaves were tested using methanol extracts in two models; pylorus ligated method and ethanol-induced ulceration method. Ulcer index and % inhibition were taken as parameters at a dose of 500mg/kg and compared with standard drug Ranitidine. The extracts showed significant activity in controlling the ulcers and ulcer score too in both the models. There was a reduction in the gastric juice pH and acidity also [7].

Analgesic activity

the extract of the root of abutilon was subjected to bioactivity guided extraction, which gave eugenol, and it showed potent activity in the tail flicking method and radiant heat method. The extracts were successively extracted with pet ether, methanol, ethanol and water. Albino mice served for the activity, and the mechanism was assumed to be the peripheral analgesic activity in the tail-flick method [8].

Antihyperlipidemic activity

The plant leaves were successively extracted with solvents and were evaluated for the antihyperlipidemic activity in albino Wistar rats at a dose of 400mg/kg in triton induced hyperglycemia administration. The results showed the apparent reduction in the serum cholesterol levels and TG levels. The extracts were also tested in high-fat diet-induced method, and there was a significant reduction in the triglycerides and LDL's. There was an increase in high-density lipids [9].

Anti-convulsant activity

Leaf extract of abutilon was tested for anticonvulsant activity against PTZ induced convulsions and MES induced convulsions method. The ethanol extract was tested at doses of 100 and 400mg/kg, estimated for an increase in the onset of seizures and lowering the extensor time. The activity was determined is due to the flavonoids and linoleic acid. The extracts showed significant activity in both methods [10].

Anti-arthritis activity

Abutilon extracts were investigated for the anti-arthritis activity in albino rats. The tests were carried out in Freund's adjuvant arthritis method. The standard drug that was used to compare the activ-

ity is Methotrexate at a dose of 750 microgram/kg. The paw oedema was considered for the assay. The methanol extract showed a better activity compared to the reference standard in lowering the paw volume [11].

Antioxidant activity

The methanol extract of the leaves of *Abutilon indicum* was investigated for the antioxidant activity for its free radical scavenging activity in the superoxide method and nitric acid method at a concentration of 250 micrograms per ml. It was proven that the extracts had about 30% and 50% activity in both the ways respectively [12].

Diuretic Activity

Abutilon seed extracts were investigated for the diuretic activity at a dose of 200 and 400mg/kg, which produced a significant activity in the sodium excretion retaining the potassium excretion. There was an increase in urine output and sodium content in urine, proving the extract was effective in helping and aiding the diuresis [13].

Immunomodulatory activity

The ethanol extract of the leaves of abutilon was ingested orally at a dose of 200 and 400mg/kg to test the immune-modulatory activity in mice. Haemagglutination, titre delayed hypersensitivity, neutrophil adhesion were tested and showed significant activity. The extracts showed a significant increase in the RBC of the sheep [14].

Anti estrogenic activity

The rats were subjected to ovariectomy and were tested for the anti-estrogenic activity by estimating the uterotrophic peroxidases and uterine peroxidases. The methanol extracts showed a significant activity by suppressing the enzymatic activity, which was induced by the estradiol and stimulation of peroxidase activity [15].

Anti larvae activity

Various solvents like pet ether, hexane, ethyl acetate, acetone and methanol are used to extract, and these extracts were used to test the potency of the plant on *Culex* larvae. Fractionation of the plant extracts yielded in sitosterol which was considered responsible for the activity against larvae. The LC50 was revealed as 11.4, 3.5 and 26.6 against *Aedes*, *Anopheles* and *Culex* respectively. It was also claimed that sitosterol could be used as a new compound that kills mosquito larvae [16].

Antifungal activity

The methanol extract of the leaves of the plant was assayed for its activity against fungal species.

The results revealed that the extract was potent in inhibiting the growth and the mortality of *Aspergillus* and *Candida*. But the extract showed the best activity against *Aspergillus niger* and minimum against *Aspergillus fumigatus* [17].

Antibacterial activity

The plant was tested for its antibacterial with the leaf ethanol extract on gram-positive and gram-negative bacteria. It was found to be effective against both the strains in the agar diffusion method.

It was compared with streptomycin and penicillin drugs and was shown significant activity against both the bacteria [18].

The methanol extract of the leaves of the plant was evaluated for the antibacterial activity against *E.coli*, *B.subtilis*, *Paeruginosa* and *S.aureus*.

Various extracts of the plant were tested on gram-negative bacteria like *K.pneumonia*, *Paeruginosa*, *E.coli* and *A.tunefaciens* in agar diffusion method. Pet ether, Chloroform and methanol extracts were tested on the bacteria and showed potent activity against all the bacteria. It showed the highest activity against *S.aureus* and least in *E.coli* [19].

Wound healing activity

The leaves were extracted with ethanol and were tested for wound healing activity in dead space wound method and excision method in rats. The extracts were tested at a dose of 400mg/kg and were estimated for granuloma, wound contraction, and epithelization etc. the extracts showed a significant wound healing compared with the standard ointment and the mechanism was assumed as increasing in the collaboration and maturation [20].

Phytochemistry

The plant been explored and claimed to contain various chemical constituents. There were different kinds of chemicals isolated from different parts of the plant.

Every plant contains carbohydrates, and amino acids in the Malvaceae family and abutilon is also no exception from it. The seeds of the plant contain carbohydrates like galactose and galacturonic acids. Raffinose is the primary sugar component present in the fats. Seeds also contain fats like stearic acid, palmitic acid, which form the principle of saturated fats. Unsaturated fats like ferulic acid, vitriolic acid, maleic acid etc. are also present [21]. It contains amino acids like leucine, asparagine, histidine, tyrosine and glycine. It is a full range of amino acids that are usually isolated from Fabaceae members, but abutilon contains all those amino acids. It was concluded that the plant contains around 30% of

proteins [22].

Beta-sitosterol was an important constituent of the constituents that are isolated from the whole plant. It was found in the hexane fraction of the extract of the plant. The common chemicals present in the plant are flavonoids, alkaloids, saponins and mucilages. Apart from the sitosterol, the plant also contains vanillic acid, coumaric acid, caffeic acid, abutylon A and fumaric acids from all the parts of the plant. It also contains essential oils like pinene, farnesol, geraniol, cineole etc. which form the flavorful parts of the aerial stems and leaves [23]. Leaves also contain carbohydrates and flavonoids. Ferulic acid and caffeic acid were recovered from the methanol extract of the leaves. A large amount of ketonic esters were isolated from the leaves that are exposed to sunlight [24].

Fats are isolated from the roots part of the plant. These are non-drying oils like stearic acid, myristic acid, lauric acid and capric acid. Sitosterol and amyirin are also isolated from the roots. Generally, flavonoids are found largely in flowers, and few of those that are separated from the plant include luteolin, chrysoberyl, quercetin, apigenin etc. there were sesquiterpene lactones also isolated from the flowers they are isoalantolactone and alantolactone [25].

CONCLUSION

The literature on the plant research work performed on the plant *Abutilon indicum* was reviewed thoroughly and given as the above review article. The plant was a significant member of the Malvaceae family, and various parts were used in intelligent systems of medicine in view of its medicinal properties. The whole plant is rich in chemical constituents which are potent in pharmacological activities like immunomodulation, anti-ulcer, anti-diabetic, anti-inflammatory etc. there is an urgent need to investigate the activities to establish the mechanisms of action and detailed phytochemical correlation with the activities.

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Conflict of Interest

Authors declared no conflict of interest.

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