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OVERVIEW OF ABUTILON INDICUM

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ABSTRACT

A tropical and subtropical shrub having comb-shaped fruits that are dentate. The juice of this plant's leaves and flowers is reputed in Ayurveda to have vata dosha-pacifying properties that aid in the treatment of diabetic neuropathy. It is also used to treat bleeding, hematuria, bloody piles, and to relieve dysuria in gonorrhoea. In cases of toothache, diphtheria, tonsillitis, and pharyngitis, leaf decoction is gargled. In the Philippines, leaf decoction is used for enemas, vaginal douches, lotions, and wound and ulcer cleaning. Alkaloids, flavonoids, tannins, glycosides, and saponins are all present in aqueous extract. In normal and severely diabetic rats, aqueous leaf extract significantly reduced blood sugar levels and provided protection from hepatotoxic chemicals in the rats. Reduced nutrient absorption is reported to cause antidiabetic action.

KEYWORDS: Abutilon indicum, Chemical constituents, Microscopical characters, Phytochemistry, Ethnobotany.

INTRODUCTION

Abutilon indicum (Indian abutilon, Indian mallow). It is also known as thuthi or atibala. It is a small shrub which belongs to malvaceae family. this plant mainly grown in tropical zones which may used for medicinal installation and also a decorative plant in olden days. its roots and leaves are used for treating ailments especially fever. its major role in protect our body health. The massive area of herbal plants is mostly covered beneficially in India the chief heritage system of medicines involves Ayurveda, siddha. The plant *Abutilon indicum* has been described that has anti-inflammatory, anti-proliferative activity, anti-arthritic activity,

analgesic, sedative property, anti-oxidant, anti-microbial activity, hepatoprotective activity, anti-diabetic, anti-cancer, anti-diarrhoeal, anti-convulsant, parricidal, wound healing, anti-estrogenic activity so, it is showed this plant consists carbohydrates, proteins, amino acids, saponins, flavonoids, glycosides, phytosterols and phenolic compounds. *Abutilon indicum* is used in both ayurvedic and unani systems.[1]

The following uses are,

LEAVES: Demulcent, Aphrodisiac, Laxative, Diuretic, Pulmonary, Sedative.

SEEDS: Astringent, Diuretic, Laxative, Expectorant, Demulcent.

PLANTS: Laxative & tonic, Anti-inflammatory, Anti-helminthic.

ROOTS: Analgesic, Diuretic.[2]

VERNACULAR NAMES

Scientific Name-*Abutilon indicum* (L) Sweet ssp. Indicum; **Urdu** -Kangahi, Siyah, Kakahi, Baseband, Surkh **Tamil**-Thuthi **English**-Country mallow, Indian Mallow, Flowering Maples **Telugu**-Tutiri-chettu **Hindi** – Kangahi, kanghi **Sanskrit**-Atibala, Balika, Balya, Bhuribala, Ghanta, Shita, Vikantaka **Assamese**-Jayavandha, Jayapateri **Bengali**-Badela **Kannada**-Tribe, Mudragida, Shrimudrigida **Kashmiri**-Kath **Malayalam**-Tutti, Katuvan, Oorpam, Uram, Urubam **Marathi**-Mudra, petari **Maharashtra**-Peeli booty, Karandi **Punjabi**-Kangi, Kangibooti **Rajasthan**-Jhili, Debi **Folk**-Kiangsi, Kakahiyaa **Arabic**-Mush-lug-ghoul **Tulu**-urki **Odia**-pedipedika.[3]

BOTANICAL DISTRIBUTION

Kingdom-Planate-Plants

Sub kingdom-Tracheobionta-Vascular plants

Super division-Spermatophyta-Seed plants

Division-Magnoliophyta-Flowering plants

Class-Magnoliopsida-Dicotyledons

Sub class-Dilleniidae

Order-Malvales

Family-Malvaceae-Mallow family

Genus-Abutilon Mill-Indian mallow

Species- *Abutilon indicum* (L.) Sweet-Monkeybush.[25]

CHEMICAL CONSTITUENTS

This whole plant accommodates mucilaginous substances and asparagines. The leading compounds of *Abutilon indicum* are saponins, flavonoids, alkaloids, hexodes, n-alkane mixtures, alkenes.

The other important constituent are beta sitosterol's, Para coumaric acid, caffeic acid, fumaric acid, abutilon –A(R)-N-(1'-methoxy carbonyl-2'phenylethyl) 4hydroxybenzamide, Para hydroxybenzoic, gala tonic, para-beta-D-glycosyloxybenzoic and amino acids. The whole plant consists of crucial oils which mainly consists of alpha-pentene, caryophyllene oxide, borneol, geraniol, geranylate, element and alpha-cineole along with number of other minor constituents.[4,5,6,7] The seed oil of the *Abutilon indicum* plants provides cis 12,13—epoxy oleic (vernolic) acid, 9,10-heptadec-8-enoic(malualic)acid. This seed oil affords palmitic, steric, oleic, linolenic acid along with cineole, element, eudesmol, farnesol, borneol.[8,9,10] The aerial parts of the *Abutilon indicum* plant involve beta-sitosterol, gossypetin-8-and 7-glucosides, cyaniding-3-rutinosides, tocopherols oil and some flavonoids. *Abutilon indicum* leaves contain steroid, sapogenins, carbohydrates and flavonoids. The roots of the plant contain Gallic acid.[14] The flowering top of *Abutilon indicum* consists of essential oil contains alpha-pinene, -cineole, elements and farnesol.[8,12]

MICROSCOPICAL CHARACTERS

The transverse section appears the following aspects feature.

The upper and lower epidermis along with covering and glandular trichomes which present in lamina region. The covering trachoma were multicellular and uniseriate in nature and the glandular trachoma were multicellular with single stalk and multi head fused together. The anomocytic type of stomata which present below the epidermis layer. The next region was mesophyll which also composed of long elongated palisade cells and calcium oxalate crystals. The midrib similar to dorsa ventral leaf. It exists of closely packed collenchyma's cells with two-three layered in upper part and three-four layered in lower part. In intracellular space the parenchyma cells and collenchyma's cells are loosely packed. The vascular bundles are composed of xylem and phloem cells.[30]

POWDER MICROSCOPY

The powder was identified on its morphological aspects as colour: Emerald green, odour: odourless and taste: sweet to characteristic in nature. The dried and pulverized fine powder was pigmented with chloral hydrate which is used to detect the presence of calcium oxalate

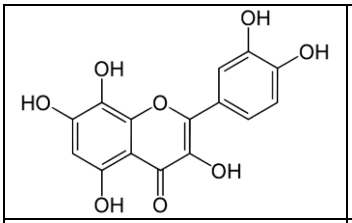
crystals. They were prismatic in nature. When stained with phloroglucinol and conc. Hcl, the vascular bundle, lignified fibres were clearly observed. With glycerine mounting trichomes were detected of covering and glandular types.[1]

PHYTOCHEMISTRY

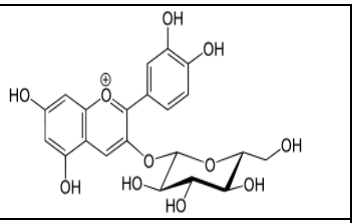
Abutilon indicum has been investigated phytochemical by various researches and found to possess number of chemical constituents.

WHOLE PLANT

The whole plants consist as a main class of compounds such as asparanin's, saponins, flavonoids, alkaloids, hexoses, n-alkane mixture alkanol. Some of the main constituents reported in the plant are β-sitosterol, vanillic acid, para-coumaric acid, caffeic acid, fumaric acid, abutilon A. (R)-N-(1-Methoxybenzoic-2-phenyl ethyl)-4-hydroxy benzamide, p-hydroxy benzoic galacturonic, gossypetin[1], cyanidin-3-glucoside[2], p-β-o-glycosyloxybenzoic and amino acids. This plant also consists essential oil which mainly contains of α-pinene, caryophyllene, caryophyllene oxide, endesmol, farnesol, barenol, geranyl acetate, elemene and α-cineole.[13] Fig:1



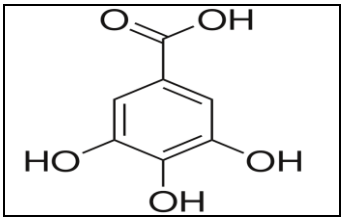
Gossypetin (1)



Cyanidin 3 – glucoside (2)

ROOTS

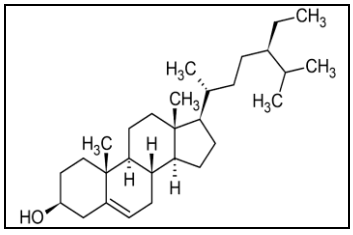
The roots of *Abutilon indicum*, non-drying oil accommodate of numerous fatty acids viz linoleic, stearic, palmitic, lauric, gallic acid[2], myristic, caprylic, capric, unusual fatty acids having C 17 carbon skeleton, sitosterol, amyrin from matter were yielded. The prime sugar component known as raffinose unsaponifiable present in root.[14] Fig:3



Gallic acid (3)

LEAVES:

The leaves of the *Abutilon indicum* included steroids, carbohydrates and flavonoids, eudesmicacid, ferulic acid, caffeic acid, β-sitosterol[3] have been isolated from the methanol extract of the plant. Authorised chemical methods for the identification of the components are IR,1H-NMR, 13-NMR, Mass spectroscopy. By using gas chromatography coupled to mass spectroscopy ethanolic leaf extract of *Abutilon indicum* for first time.[15]



β – Sitosterol (4)

FLOWERS

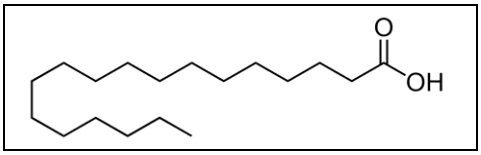
7-Flavonoids compounds are Luliolin, chrysoeniol, luteolin7-O-beta glucopyranoside, chrysoeriol 7-O-beta glucopyranoside, apigenin 7-O-beta glucopyranoside, quercetin 3-O-beta glucopyranoside, quercetin 3-O-alpha-rhamnopyranosyl (1→6) beta-glucopyranoside were separated and recognized from the flowers of the plant.2 sequeterpene lactones and isolantolactone have been first time reported.[14]

FRUITS

Fruits consists of flavonoids and alkaloids.[14] Fig:2

SEEDS

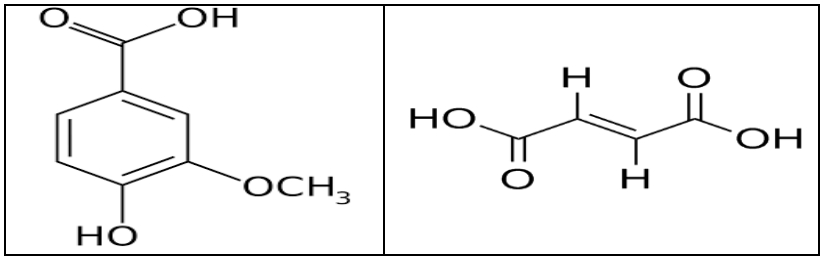
Water soluble galactomannan were separated from the seed of the plant which consists of D-galactose. D-mannose in 2:3 molar ratio. The seed oil carries cis 12,13, epoxy oleic (vernolic) acid,9,10- methylene octadec-9-enoic (sterulic)acid, as well as 8,9-methylene-heptadec 8-enoic (malvalic) acid. The seed oil has broadcasted the presence of high amount of unsaturated fatty acids, stearic acid[4] and palmitic acid from the studies of TLC-GLC.[20] Fig:4



Stearic acid (5)

AERIAL PARTS

The aerial parts of the *Abutilon indicum* plant incorporated n-alkane mixture an alkanol fraction and β-sitosterol. Fumaric[7], p-coumaric, vallinic[5], caffeic and p-hydroxybenzoic-β-D-glucosyloxybenzoic acids and gluco-vannilloylglucose, fructose, aspartic acid, histidine, threonine, serine and luiene, calactose and galacturonic acids are present in mucilage fraction, saponin, flavonoids and alkaloids are present in shoot and flowers.[16]



Vanillic acid (6) **Fumaric acid (7)**

PHARMACOLOGICAL ACTIVITY

1. ANTI- CANCER ACTIVITY

The potential anti-oxidant properties and cytotoxic activity screened in the medicinal plants of *Abutilon indicum* and blumeamollis. The extract was also concealed to assess the anti-oxidant activity using FRAP,1,1-Diphenyl-2-picrylhydryzyl(DPAH) radical savaging activity and nitric oxide radial inhibition assessment by the use of griesillosvoy reaction with slight modification .by increased the concentration and duration of the extract manifest anti-oxidant properties as well as inhibitory effect on cancers.[17]

2. ANTI-MYCOTIC ACTIVITY

Methanolic extract of various parts of *Abutilon indicum* were tested for their ability to inhibit the aetiological agents of dermal fungal infections in humans. The anti-mycotic activity were screened by performing the test of minimum inhibitory concentrations and disc diffusion method. Methanolic extract of leaves of *Abutilon indicum* shows extraordinary anti-fungal activity against Trichophyton rub rum. The ethnobotanical information and ethno pharmacologic exploration relies in great part on the search for novel anti-fungal agents.[27]

2. LARVICIDAL ACTIVITY

Larvicidal activity of crude hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of *Abutilon indicum* were assayed for their toxicity agents the early fourth-instar larvae of Culex quin quefasciatus. All extracts showed average larvicidal effects, the highest

larval mortality was found in petroleum ether extract of *Abutilon indicum*. So, the petroleum ether extract of Abutilon indicum may be considered as a potent source and beta-sitosterol as a new natural mosquito larvicidal agent.[28]

3. ANTI-DIARROEAL ACTIVITY

The methanolic extract and aqueous extract acquired notable anti-diarrhoeal activity in castor oil induced diarrhoea and prostaglandin E2 induced diarrhoea compared to the control group.

4. WOUND HEALING ACTIVITY

A dose of 400 mg/kg of the ethanol extract of the plant have prominent wound healing activity. The contract of abscission wound heals from 2 to 4 weeks.[1]

5. HYPOGLYCEMIC ACTIVITY

The *Abutilon indicum* shows important hypoglycaemic effect in alcohol and water extract of the plant leaves (400mg/kg pp.) that may use in normal rats 4 hours after administration (23.10% and 26.95% respectively) aqueous extract was also used to reduce blood glucose level.[18]

6. ANTI-ASTHMATIC ACTIVITY

The dried aerial parts of *Abutilon indicum* are documented in decreasing the severity and effectiveness of commonly observed symptoms of bronchial asthma (dyspnoea, cough, chest tightness and wheezing). In patients having mild to moderate bronchial asthma have been found to significantly increase the pulmonary function measured as forced vital capacity (FVC), forced expiratory volume in 1 sec (FEVI) and peak expiratory flow rate (PEFR) in Patients having mild to moderate bronchial asthma.[19]

7. DIURETIC ACTIVITY

The *Abutilon indicum* lowers shows 70% of hydro alcoholic extract of diuretic activity. The excessive dose of the extract (250and500mg/kg) having a dose dependent significant diuretic effect. Whereas the extract was compared to control group at 100mg/kg dose failed to show diuretic property Diuretic effect (test extract) were found to be less potent than the reference standard drug, furosemide.[26]

8. ANTI-ESTROGENIC ACTIVITY

The anti-estrogenic effect of metabolic extracts of *Abutilon indicum* on uterotropic and uterine peroxidase activities in ovariectomized rats was considered. Oestradiol, were induced

by uterotropic response as well as significant suppression of enzymes was found to be because which was present in this extract, a marginal stimulation in peroxidase activity was clearly notified, if not treated with estradiol. These changes in peroxidase activity recommended that *Abutilon indicum* shows extremely low degree of esreogenicity because of highly potent estrogen antagonist.[26]

9. ANTI-ARTHRITIC ACTIVITY

The various extracts of *Abutilon indicum* were studied for its anti-arthritic activity in *Invitro* studies in male albino rats. The assessment of anti-arthritic activity was performed using Freund's adjuvant induced arthritis model. Methotrexate (0.75mg/kg bw) was used as standard drug. The methanolic extract of *Abutilon indicum* exhibited significant anti-arthritic activity. Treatment with *Abutilon indicum* 400mg/kg showed notable reduction in paw volume on both 7th and 14th day. Reference standard Methotrexate also showed same result in this regard. *Abutilon indicum* 100 and 200 mg/kg were found to be insignificant in reducing paw volume.[31]

10. ANTI-CONVULSANT ACTIVITY

Anti-convulsant activity of *Abutilon indicum* leaf extracts was studied using Pentylene tetrazole (PTZ) and Maximum Electro Shocked (MES) induced convulsions in wistar rats. In PTZ induced convulsions, 100mg/kg and 400mg/kg of Ethanolic extract was found to increase the onset of clonic convulsions and decreased onset of tonic seizures and thus exhibited a important anti-convulsant effect. In MES induces seizures, 100mg/kg and 400mg/kg of Ethanolic as well as aqueous extracts showed prominent protective effect by increasing the onset of clonic convulsions time and decreasing extensor time as compared to control group. This anti-convulsant effect was attributed to linoleic acid and/or flavonoid constituents present in the extracts.[32]

AYURVEDIC PROPERTIES

GUNA (Properties)-Laugh, Snigdh, Pichil

RASA (Taste)-Madura

VIPAK (Metabolism)-Madura

VIRYA (Potency)-Sheet

PRABHAV (Impact)-Bayle.[25]

DOSE CALCULATION

DOSAGE	FORMULATION
5-7gm	Leaf Powder
1-3gm	Seed powder
125-500mg	Seed extract
3-6gm	Root powder
250-750mg	Root extract

IMPORTANT FORMULATION

The commonly used ingredient of Atibala as in the preparation of Ayurveda medicated oil used for massaging externally in vatavyadhi (diseases due vatadosha) such as facial palsy, paraplegia, gout, rheumatism etc. Fig: 5&6.

- Balalaika
- Narayan Talia
- Mahanarayantaila

PRECAUTION

It is advisable to avoid or consult a physician before thuthi during pregnancy, heart disease and diabetes.[3]

ETHANOBOTANICAL USES

The ethnobotanical surveys were conducted by ethnobotanist's were reported that almost all the parts of this plant are useful. The parts of the plant used for the medicinal purposes such as febrifuge, antiemetic, anti-inflammatory in urinary, anthelmintic, piles, urine discharge and lumbago has been documented in the natives of India, Malaya, Philippine, Islands and Indochina. The formulation of plants (leaves and seeds crushed and mixed with water to form paste) which is gently applied to penis to cure syphilis and it is also administered orally to cure piles and to relieve leg pains. The leaves are used in the treatment of cataract and diarrhoea with the help of eye wash and mouth eye wash.[20,21] The mixture of leaf powder and wheat flower as in the form of dough is taken daily during night for about 1-2 month for cure of uterus displacement.[22] For the treatment of snake bite, the leaf extract is Chloride then the decoction is diluted with water and given orally to treat hemorrhagicseplicemia.[23] The powdered form of seed is mixed with water taken orally as aphrodisiac and laxative. The plant root has been used to treat gonorrhoea and leprosy. The infusion of the part is used orally to cure fever, dry cough and bronchitis.[24]

TRADITIONAL USES

Virtually, all the parts of the plant (Atibala) are of medicinally and traditionally used for the treatment of various disorder was discovered by ancestors. The plant roots have various properties such as demulcent, diuretic, in chest infection and arthritis. The root infusion is advised to take orally during fever as a cooling medicine and is assessed useful in stranger, haematoma and in leprosy. The leaves juice is used to cure toothache, tender gums and internally for inflammation of bladder. The bark is used as febrifuge, anthelmintic, alexiteric, astringent and diuretic. The seeds of the plant are used in piles, laxative, expectorant, in chronic cystitis, greet and gonorrhoea.[30]

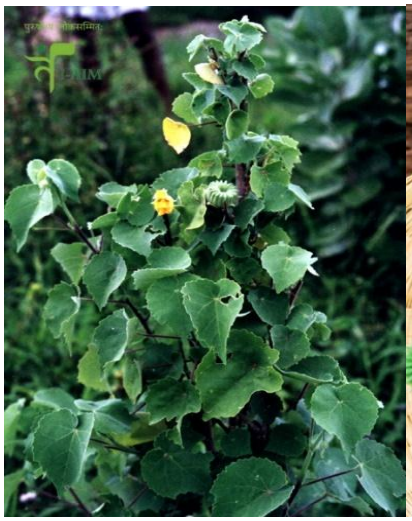


FIG: 1 PLANT

FIG: 2 FRUITS

FIG: 3 ROOT

FIG: 4 SEED

FIG: 5 TABLET

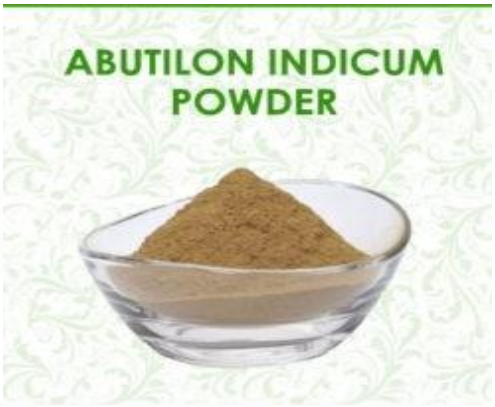


FIG: 6 POWDER

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