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A Review on: Phytochemical and Pharmacological Activity of *Abutilon indicum*

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ABSTRACT

Medicinal plants are being widely used, either as a single drug or in combination in the health care delivery system. Medicinal plants can be an important source of previously unknown chemical substances with potential therapeutic effects. *Abutilon indicum*.Linn (Malvaceae) is a shrub distributed throughout India. The various parts of the plant (leaves, roots, seeds, and seed oil) are widely used by various tribal communities and forest dwellers for the treatment of a variety of ailments. The plant is documented to possess beneficial effects as sweet, cooling, digestive, laxative, expectorant, diuretic, astringent, analgesic, anti-inflammatory, anthelmintic, demulcent and aphrodisiac. The plant contains saponins, flavonoids, alkaloids, hexoses, n-alkane mixtures alkanols, and amino acids as main classes of compounds. Scrutiny of the literature revealed some notable pharmacological activities like antibacterial, antipyretic, antimalarial, antifertility, hepatoprotective, hypoglycemic and wound healing. The present review is an attempt to highlight the various traditional uses as well as phytochemical and pharmacological reports on *Abutilon indicum.*

INTRODUCTION:-

The *Abutilon indicum* L. genus of the Malvaceae family comprises about 150 annual or perennial herbs, shrubs or even small trees widely distributed in the tropical and subtropical countries of America, Africa, Asia and Australia. It is known as "*Atibala*" in Sanskrit or Hindi[1,2]. Literally, "*Ati*" means "*Very*" and "*Bala*" means "*Powerful*", referring to the properties of this plant as verypowerful[3,4]. It is a fairly common roadside weed, which is grown in hotter parts of India as a weed. In traditional systems of medicine, various plant parts such as roots, leaves, flowers, bark, seeds and stems have been used.In traditional medicine, *A. indicum* is used as a demulcent, aphrodisiac, laxative, diuretic, and pulmonary and sedative (leaves)[5].

Macroscopic:-

Taproots, fairly long with many lateral branches, 1.5-2 cm in diameter, light brown, outer surface smooth with dot like lenticels, bark thin and can be easily peeled off, odour, feeble, taste, astringent and bitter[6,7].

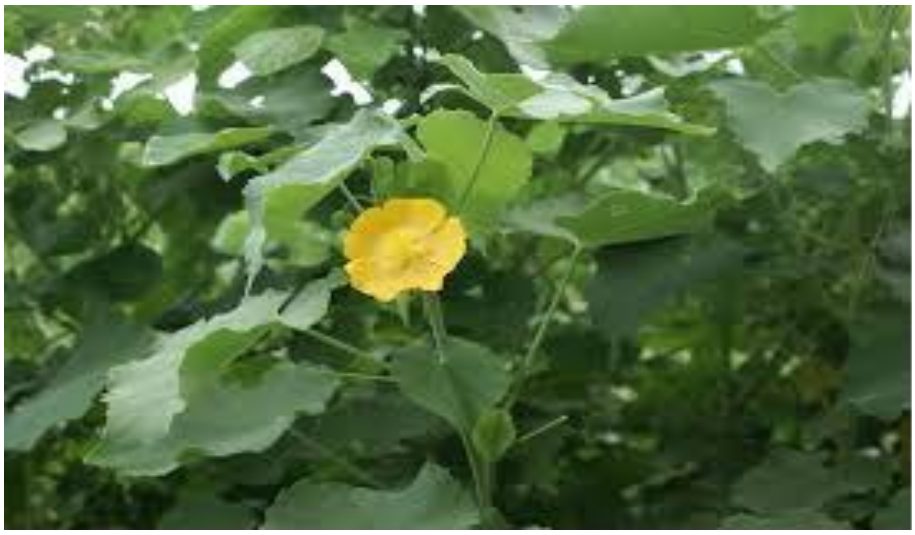
Microscopic:-

Transverse section of root shows a thin cork of 4-7 or more tangentially elongated rectangular cells,cork cambium, single layered, and at the lenticel regions followed by 2-3 layers of secondary cortex of thin-walled, almost cubical or rectangular cells, containing small clusters of calcium oxalate in most of cells, phellogen followed by 3-4 layers of thin-walled cells of cortex, some cells of cortex which are above the conical strands of bast, crushed, small starch grains, 6-9 μ in diameter, present in some of the cells,phloem forms the major portions of bark and present as conical strands with their bases towards the wood and with dilate distal ends of the primary medullary ray in between them, fibres, present in groups of10-12 in these conical strands, in tangential rows,alternating with thin-walled phloem elements, towards wood fibre groups, element in between the fibres mostly consists of phloem parenchyma, Some cells contain cluster crystals of calcium oxalate and a few others have starch grains, some phloem cells towards periphery appear compressed andcrushed, inner to phloem, a cambium present,parenchyma thick-walled and slightly widerthan fibre cells, but less thickened, single orrarely compound starch grains present,tetrarch bundle or primary xylem present at thecentre of wood, medullary rays uni or biseriatewiden much towards distal ends,

most of theray cells contain starch grains and somecontain cluster of calcium oxalate, starchgrains present in wood[8].

Botanical Description:-

The leaves are ovate, acuminate, toothed, rarelysubtrilobate and 1.9-2.5 cm long. The flowers are yellow, the peduncle is joined above the middle[9,10]. The petioles 3.8-7.5 cm long; stipules 9 mm long; pedicels often 2.5-5 mm long, axillary solitary, jointed very near the top; calyx 12.8 mm long, divided in to the middle, lobes ovate, apiculate and corolla 2.5 cm diameter, yellow, opening in the evening. The fruits are capsule, densely pubescent, with conspicuous and horizontally spreading beaks. The stems are stout, branched, 1-2 m tall, and pubescent. The seeds are3-5 mm, reniform, tubercled or minutely stellate-hairy, black or dark brown[11,12].



Synonym(s): *Sida indica* L.,

Vernacular names of *Abutilon indicum*

Hindi - Kanghi, Kakahi

English - Country mallow, Indian mallow

Bengali – Petari

Malayalam - Dabi, Uram

Guajarati - Khapat, Kansi, Dabli

Marathi - Mudra, Petari

Tamil -Tutti, Paniara, Hutti

Telugu -Tutturubenda

scientific classification

Kingdom: Plantae

Order: Malvales

Family: Malvaceae

Genus: Abutilon

Species: *indicum*

PHYTOCHEMISTRY

Abutilon indicum has been explored phytochemically by various researchers and found to possess number of chemical constituents.

Whole plant

The whole plant contains mucilaginous substances and asparagines. saponins, flavonoids, alkaloids, hexoses, n-alkane mixtures[13,14]. Some important constituents reported in theplant are *β*-sitosterol, vanillic acid, *p*-coumaric acid, caffeic acid, fumaric acid, Abutilon A, (R)-N-(1'- methoxycarbonyl-2'phenylethyl)-4-hydroxybenzamide, hydroxybenzoic, galacturonic, *p*-β-D-glycosyloxybenzoicand amino acids[15,16].The plant *Abutilon indicum* contains of essential oil which mainly consists of α-pinene, caryophyllene, caryophyllene oxide, endesmol, farnesol, borenol, geraniol, geranyl acetate, element and α-cineole [17,18].

Root

From the roots, non–drying oil consists of various fatty acids viz. linoleic, oleic, stearic, palmitic, lauric, myristic, caprylic, capric, and unusual fatty acid having C17 carbon skeleton, sitosterol, and amyrin from unsaponifiable matter were yielded [19].

Leaves

The leaves of the plant contain steroids, sapogenins, carbohydrates and flavonoids[20]. Eudesmic acid, ferulic acid and caffeic acid have been isolated from the methanol extract of leaves of the plant *Abutilon indicum*.IR, 1H-NMR, 13C-NMR, mass spectroscopy and chemical methods allowed the identification of thesecompounds.[21]. Flavonoids, Terpenes, Amino acids, Aldehyde, Hydrocarbon, Ketone, Fatty acids and esterswere reported for the first time from the ethanolic leaf extract of *Abutilon indicum* by using gas chromatography coupled to mass spectrometry (GC-MS) [22].

Flower: Seven flavonoids compounds: luteolin, chrysoeriol, luteolin 7-O-beta-glucopyranoside, chrysoeriol 7-O-betaglucopyranoside, apigenin 7-O-beta-glucopyranoside, quercetin 3-O-beta-glucopyranoside, quercetin 3-Oalpha- rhamnopyranosyl (1 --> 6)-beta-glucopyranoside, were isolated and identified from the flowers of *Abutilonindicum* (L.) Sweet

(Malvaceae)[23]. Two sesquiterpene lactones i.e. alantolatone and isoalantolactone have beenfirst time reported [24].

Fruits

Fruits contain flavonoids and alkaloids[25].

Seed

A water-soluble galactomannan has been isolated from the seeds of *Abutilon indicum* containing -galactose and-mannose in 2:3 molar ratio [26]. The seed oil of the plant affords *cis* 12, 13-epoxyoleic (vernolic) acid, 9, 10-methylene octadec-9-enoic (sterculic) acid, as well as 8, 9-methylene-heptadec-8-enoic (malvalic) acid[27]. TLC-GLCstudies of seed oil revealed the presence of high amount of unsaturated acids. Stearic acid and palmitic acid werethe principal components of the saturated acids. Raffinose as a prime sugar component was found in seed[28]. Amino acid profile of seed proteins (31%) contains threonine, glycine, serine, glutamine, lysine, methionine, isoleucine, proline, alanine, cystenine, tyrosine, phenylalanine, leucine, asparagine, histidine, valine, argininine[29].

Figure 1: *Abutilon indicum* leaf

Figure 2. *Abutilon indium* flower and fruit

Figure 3: *Abutilon indicum* whole plant

Figure 4: *Abutilon indium* seed

Chemical Compounds	Parts
Proteins	Root
Alkaloids	Leaf
Amino acid	Leaves
Carbohydrates	Root
Free amino acids	Root
Saponins	Root, Leaf
Glycosides	Root, Leaf, Flower
Caffeic acid	Whole plants
Carbohydrates	Different parts of plants
Essential oil	Different parts of plants
Flavonoids	Root, Leaf
Sesquiterpenes	Different parts of plants
Fatty acids	Different parts of plants
Free Acid	Root, Leaves
Tannin	Root, leaves, stem
Resin	Root
Mucilage	Leaves
Triterpenoids	Leaves
Apigenin	Flowers
Chrysoenol	Flowers
Glucopyranoside	Flowers
Galactomannose	Seeds
D-galactose	Seeds
D-mannose	Seeds
Luteolin	Flowers
Quercetin	Flowers

PHARMACOLOGICAL ACTIVITIES:-

Diuretic activity:

Diuretic and Natriuretic activities were carried out by the administration of normal saline along with the treatment modules[30]. The volume of urine (in ml)and the Na+ and K+ content in the urine were measured. The extract at 200 and 400 mg / kg, produced significant diuresis and increased sodium elimination but not potassium[31].

Antioxidant and Antimicrobial activity:

The antioxidant and antimicrobial activities of chloroform fraction of alcoholic extract of whole plant of *Abutilon indicum* extract was screened for antioxidant and free radical scavenging effects at various concentrations[32]. The antimicrobial activity was studied using the agar well diffusion assay. Extract of *Abutilon indicum* was found to be most effective against *Staphylococcus aureus* followed by *Bacillus sublitis* whereas in case of Gram-negative bacteria, extract was found to be most effective against *Escherichia coli* showing the maximum zone of inhibition followed by *Pseudomonas aeruginosa*[33]. The ethanolic extract showed high activity against *C. albicans* than that of the standard drug amphotericin B.

Hepatoprotective activity:

The hepatoprotective activity of hydroalcoholic and ethyl acetate extract of leaf of *Abutilon indicum* (AI) in CCl4 induced toxicity[34]. The hydroalcoholic extract at the dose of 200 mg/kg and 400 mg/kg and ethyl acetate extract 200 mg/kg b. wt was evaluated by inducing hepatotoxicity with CCl4 and using silymarin (100 mg/kg) as the reference standard. Biochemical parameters like total protein, triglyceride and serum bilirubin level were analysed. A section of liver was subjected to histopathological studies[35]. It is reported that the ethyl acetate extract of *Abutilon indicum* possess greater hepatoprotection as compared to hydro alcoholic extract against CCl4 induced hepatotoxicity.

Anticancer activity:

The study medicinal plants namely *Abutilon indicum* was chosen to screen for potential anti-oxidant properties and cytotoxic activity[36]. The extract was also screened to assess the an-tioxidant activity using 1, 1-Diphenyl-2-picrylhydryzyl [DPPH] radical scavenging activity and Nitric Oxide radical inhibition estimated by the use of Griess reaction with slight modification. These extracts show anti-oxidant properties as well as inhibitory effects on cancer cells with the increased concentration and duration[37].

Antidiarrhoeal activity:

Leaf extracts of *Abutilon indicum* were evaluated for anti-diarrhoeal activity by gastro-intestinal motility, and castor oil-induced diarrhea. The methanolic and aqueous extracts showed significant antidiarrhoeal activity in castor oil-induced diarrhea and prostaglandin

E2- induced diarrhoea. These extracts reduced diarrhoea by inhibiting intestinal peristalsis; gastrointestinal motility and PGE2 induced enteropooling[38].

Anti convulsant activity:

The ethanolic extract was found to increase the onset of clonic convulsions and decreased onset of tonic seizures and thus exhibited a significant anticonvulsant effect[(39-40)]. The aqueous extracts showed a significant protective effect by increasing the onset of clonic convulsion time and decreasing extensor time.

Wound healing activity:

The wound healing activity of *Abutilon indicum* Linn. There was a significant increase in the wound closure rate. All the extracts were obtained and subjected to phytochemical studies. The progressive changes in the wound area were monitored by tracing the wound margin every day. From the result, it is concluded that the petroleum ether extract of "*Abutilon indicum*" Linn had greater wound healing activity than the Ethanolic extract.

Antiasthmatic activity:

This study reported the effectiveness of powder of dried aerial parts of *Abutilon indicum* in decreasing the severity of commonly observed symptoms of bronchial asthma i.e. dyspnoea, cough, chest tightness, and wheezing. It was also found to significantly increase the pulmonary function measured as forced vital capacity (FVC), forced expiratory volume in 1 Sec (FEV1) and peak expiratory flow rate (PEFR) in patients having mild to moderate bronchial asthma.

CONCLUSION:-

Abutilon indicum has many more pharmacological properties like, diuretic activity, antioxidant and antimicrobial activity , hepatoprotective activity, anticancer activity , antidiarrhoeal activity, anticonvulsant activity, wound healing activity, anti-asthmatic activity. The main chemical constituents are carbohydrates, steroids, glycosides, flavonoids, tannins and phenolic compounds. Hence this review article, the effort has been taken to collect and compile the details notes on ***Abutilon indicum*** which will be useful to the society to venture into the field of alternative systems of medicine.

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