

## REVIEW OF ATIBALA (ABUTILON INDICUM) FOR ITS PHARMACOLOGICAL PROPERTIES

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### ABSTRACT

Abutilon indicum (Linn) is an important medicinal plant. The medicinal uses of *Atibala* are of utmost importance. In the *Ayurvedic* literature also, it is one of the most commonly used herbs. A review of research work done regarding ancient and Ayurvedic properties of *Atibala* i.e. abutilon indicum is mentioned here. The study shows that *Atibala* possesses various pharmacological properties, according to Ayurveda *Rasayan, Kasahar, Vednahar, Vajikaran, Krimighna, Grahi, Vathar, Varnya, Dahashamak, Vishaghna, Hridya, Kandughna, Kushthaghna, Balya, Tridosh Shamak, Klednashak, Mridu Virechak*. According to modern science it possesses Anti estrogenic activity, Anti diarrheal activity, Anti asthmatic activity, Immunomodulatory activity, Wound healing activity, Anti ulcer activity, Hepatoprotective activity, Analgesic and anti Inflammatory activity, Anti fungal activity, Anti Diabetic activity, Larvicidal activity, Cardio protective activity, Anti oxidant activity, Diuretic activity, Hypoglycemic activity and

Anti arthritic activity.

**KEY WORDS:** Atibala, Abutilon indicum, Pharmacological actions.

## INTRODUCTION

*Abutilon indicum* (Linn), family Malvaceae, commonly known as *Atibala* is an important medicinal plant. Almost all the parts of *Atibala* are of medicinal importance and used traditionally for the treatment of various ailments. In the *Ayurvedic* literature it is one of the most commonly used herb. *Charka and Sushruta* both highlighted its importance in the management of *Rasyana chikitsa*. *Charak* included it in *Balya Dashmani Gana* and also in *madhur skandha*. *Acharya Sushruta* has given more emphasis on medicinal utility of *Atibala*, and states that *Atibala* taila can be used in the treatment of *Mudhagarbha* as such mentioned for *bala taila*. *Acharya Sushruta* in *sushruta samhita* sutrasthana chapter 39 has illustrated it as *sanshamana dravya*. *Acharya Vagbhata* while mentioning the treatment of *Ashamari bhedana* by *pashana bhedadi kwath* has included *Atibala* as its constituent. According to *Acharya Chakrapani* the kwath of *atibala* is a remedy for *Mutrakritcha*. The powdered form of *Atibala moola* or *swaras* alongwith the *anupana* of *mishri* and *madhu* treats *raktapradara* as per *Acharya Bhavamishra*.<sup>[1]</sup>

### Properties Mentioned In Nighantus

Sr.No	Nighantu	Properties
1	<b>Bhavprakash Nighantu</b> <sup>[2]</sup>	<i>Rasayan, Kashar, Vednahar, Mriudu virechak, Vajikar, Krimighna, Vatashamak</i>
2	<b>Kaiyadev Nighantu</b> <sup>[3]</sup>	<i>Grahi, Dhatuwardhak, Balya, Vranaropan, Varnya.</i>
3	<b>Raj Nighantu</b> <sup>[4]</sup>	<i>Krimighana, Dahashamak, Vishaghna, Kledahar, Chadrighna</i>
4	<b>Dhanvantari Nighantu</b> <sup>[5]</sup>	<i>Balya, Tridosh Shamak, Raktapittahar</i>

### Vernacular Names<sup>[6]</sup>

English: Country mallow, Indian mallow

Hindi : Kanghi, Kakahi

Sanskrit: *Atibala*

Marathi: Mudra, Petari

Latin : *Abutilon indica*

Family: Malvaceae

### Botanical Description

It is perennial shrub. It is found as weed in sub-Himalayan tracts, hills up to 1200m and in hotter parts of India. The leaves are ovate, acuminate, toothed, rarely subtrilobate and 1.9-2.5 cm long, the flowers are yellow in color, peduncle jointed above the middle. The petioles 3.8-7.5cm long ; stipules 9mm long pedicels often 2.5-5mm long, axillary solitary, jointed very

near the top; calyx 12.8mm long, divided in to middle, lobesovate, 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, 1-2m tall, pubescent. The seeds are 3-5 mm, reniform, tubercle or minutely stellate-hairy, black or dark brown.<sup>[6, 7]</sup>

### **Pharmacological actions**

#### **Anti estrogenic activity**

Johari et al. studied the anti-estrogenic effect of methanollic extract of *A.indicum* on uterotrophic and uterine peroxidase activities in ovari ectomized rats .This extract was found to cause significant suppression of enzyme activity as well as uterotrophic response induced by estradiol, whereas in the group, not treated with estradiol, a marginal stimulation in peroxidase activity was observed. These changes in peroxidase activity suggested that *A. indicum* must be a highly potent estrogen antagonist with an extremely low degree of estrogenicity.<sup>[8]</sup>

#### **Anti-diarrheal Activity**

Leaf extract of *Abutilon indicum* were evaluated for anti-diarrheal activity by gastro-intestinal motility ,castor oil-induced diarrhea and prostaglandin E2- induced enteropooling in rats wherein the methanolic and aqueous extracts showed significant anti diarrheal activity in castor oil- induced diarrhoea and prostaglandin E2- induced diarrhoea. These extract were reported to reduce diarrhoea by inhibiting intestinal peristalsis.<sup>[8,9]</sup>

#### **Anti-Asthmatic Activity**

Powder of dried aerial parts of *Abutilon indicum* in decreasing the severity of commonly observed symptoms of bronchial asthma i.e. cough, chest tightness, wheezing and dyspnea. It was also demonstrate to significantly increase the pulmonary function measured as forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV 1) and peak expiratory flow rate (PEFR) in patients having mild to moderate asthma. In another study, methanollic extract inhibited experimentally induced rat peritoneal mast cell degranulation and edema formation. The significant reduces in carrageen induced rat paw edema at the dose of 250 ad 500 mg/kg, p.o. induced anti inflammatory activity and this activity was postulated towards the anti asthmatic effect.<sup>[8]</sup>

### Immunomodulatory Activity

The ethanolic extract and aqueous extract of leaves of *Abutilon indicum* was administered orally at the dosage levels of 200 mg/kg/ day body weight in mice. The assessment of immunomodulatory activity on specific and non specific immunity were studied by hemagglutination antibody (HA) titer, delayed type hypersensitivity (DTH), neutrophil adhesion test and carbon clearance test. Oral administration of *Abutilon indicum* showed a significant increase in the production of circulating antibody titer in response to sheep red blood cells (SRBCs). The study demonstrated that *Abutilon indicum* triggers both specific and non-specific responses to greater extent.<sup>[10]</sup>

### Wound healing Activity

The ethanolic extract of *Abutilon indicum* was studied for wound healing activity using incision, excision and dead space wound models in albino rats. This extract at dose of 400mg/kg showed significant increase in wound contraction rate, skin breaking strength, granuloma strength and dry granuloma weight. Moreover, the decrease in epithelialisation period.<sup>[8]</sup>

### Anti ulcer Activity

Antiulcer activity of methanol extract of *A.indicum* leaves in pylorus ligated and ethanol induced ulceration in the albino rats. Preliminary methanol extract of *A.indicum* was conducted to acute oral toxicity study according to the OECD guideline no.425. Based on two dose levels i.e. 250 and 500 mg/kg were selected for the further study. Ranitidine at 50 mg/kg was used as the standard drug. Methanol extract of *A.indicum* leaves showed significant ( $p < 0.005$ ) decrease in the gastric volume, free acidity and total acidity. However  $P^H$  of the gastric juice was significantly ( $p < 0.005$ ) increase only at higher dose, 500mg/kg. It showed also significant ( $p < 0.005$ ) decrease in number of ulcers and ulcer score index in pylorus ligation and ethanol induced ulceration models. The results demonstrate significant anti ulcer properties in a dose dependent manner. The anti ulcer properties of extract may be attributed to the presence of photochemical like flavanoids, alkaloids and tannins present in the plant extract with various biological activities.<sup>[11]</sup>

### Hepatoprotective Activity

The aqueous extract of the leaves of *A. indicum* demonstrated significant hepatoprotective activity at 100 and 200 mg/kg dose levels in CCl<sub>4</sub>-treated rats. The blood samples were collected and the serum was estimated for SGOT (serum aspartate aminotransferase), SAP

(serum alkaline phosphatase) and total bilirubin content.  $\text{CCl}_4$ -induced changes were significantly reduced in the *A. indicum*-treated animals.<sup>[12]</sup>

### Anti-Arthritic Activity

The present study deals with anti-arthritic activity in-vitro pharmacological models such as, inhibition of protein denaturation, effect of membrane stabilization, and proteinase inhibitory action. Herbal extract (aq.) with two different concentrations (100mcg/ml and 250mcg/ml) was used and results were compared with (250mcg/ml) acetyl salicylic acid. The herbal extract showed dose dependent activity which was found to be better than that of acetyl salicylic acid.<sup>[13]</sup>

### Hypoglycemic Activity

The hypoglycemic activity of *Abutilon indicum* leaf extracts in rat was studied. Alcohol and water extracts of *Abutilon indicum* leaves (400 mg/kg, p.o.) showed significant hypoglycemic effect in normal rats 4 h after administration (23.10% and 26.95%, respectively).<sup>[14]</sup>

### Lipid lowering Activity

Lipid lowering effect of the successive extracts of the leaf of *Abutilon indicum* was evaluated in triton and diet induced hyperlipidemic models of wistar albino rats. The ethanolic and water extract at 400 mg/kg dose levels inhibited the elevation in serum cholesterol and triglyceride levels on Triton WR 1339 administration rats. The extract at the same dose level significantly attenuated the elevated serum total cholesterol and triglycerides with an increase in high-density lipoprotein cholesterol in high-fat diet-induced hyperlipidemic rats.<sup>[15]</sup>

### Analgesic and Anti inflammatory Activity

The analgesic and anti inflammatory activity of plant extract of *A. indicum* was studied. The analgesic activity was found out by eddy's hot plate method by using standard pentazocin. The anti inflammatory activity was found out by Carragenan induced paw edema method by using standard Diclofenac sodium. The anti-inflammatory and analgesic activity of chloroform, pet.ether, Ethanol & Aqueous extract were tested against at a dose level of 400 mg/kg body wt. The anti inflammatory activity showed  $*p < 0.001$  compared with standard. The analgesic activity showed  $*P < 0.001$  compared with standard. In both the activity the methanol and aqueous extract have little more activity than the other extracts.<sup>[16]</sup>

### Larvicidal Activity

Larvicidal activity of crude hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of *Abutilon indicum* were assayed for their toxicity against the early fourth –instar larvae of *Culex quinquefasciatus*. All extracts showed moderate larvicidal effects; however, the highest larval mortality was found in petroleum ether extract of *Abutilon indicum*. Bioassay-guided fractionation of *Abutilon indicum* led to the separation and identification of a beta-sitosterol as potential new mosquito larvicidal compound with LC<sub>50</sub> value of 11.49, 3.58, and 26.67 ppm against *Aedes aegypti* L, *Anopheles stephensi* Liston and *C. quinquefasciatus* say (Diptera: Culicidae), respectively. The results showed that the petroleum ether extract of *Abutilon indicum* may be considered as a potent source and beta-sitosterol as a new natural mosquito larvicidal agent.<sup>[17]</sup>

### Anti diabetic Activity

Administration of the extract (0.5 and 1 g/ kg body weight) in oral glucose tolerance test led to a significant reduction in plasma glucose levels in 30 minutes after the administration in moderately diabetic rats, as compared with untreated rats ( $p < 0.05$ ), and this was at a faster rate than the use of an glibenclamide, antidiabetic drug. The inhibition of glucose absorption through the small intestine was investigated using an everted intestinal sac. The results demonstrated that the extract at concentrations of 0.156 to 5 mg/ml caused a reduction of glucose absorption in a dose response manner. The highest response was noted at a dose of 2.5mg/ml. The promotion of the extract on insulin secretion was confirmed by incubating  $\beta$  cell of pancreatic islets and INS-1E insulinoma cells with the extract at 1 to 1000  $\mu$ g/ml. These results suggest that the aqueous extract from the *A. indicum* plant has anti diabetic properties.<sup>[18]</sup>

### Anti oxidant Activity

Anti oxidant activity of methanolic extract of *A.indicum* leaves was investigated for its free radical scavenging activity by determining the nitric oxide and super oxide radical scavenging activity. Maximum scavenging of nitric oxide radical found were 28.74% and 49.62% respectively at 250  $\mu$ g/ml concentration.<sup>[23]</sup> *A. indicum* L. (Malvaceae) and *A.muticum* DC.(Malvaceae) are traditional medicinal herbs used for anthelmintic, hepatoprotective, analgesic, and hypoglycemic properties. These effects may be correlated with the presence of anti oxidant compounds. Extracts from the aerial parts and roots of both species were prepared and evaluated for their total anti oxidant capacity (TAC), total phenolic

content, and total flavonoid content. The Trolox equivalent anti oxidant capacity (TEAC) of all the extracts of both plants was found, employing ABTS and FRAP assays.. TEAC values ranged from 3.019 to 10.5 $\mu$ M for n-hexane and butanol fraction of *A. indicum* and from 2.247 to 14.208 $\mu$ M for n-hexane and butanol fractions of *Abutilon muticum* respectively, using the ABTS assay. The FRAP assay showed reducing powers of the fraction in order of butanol > ethyl acetate > chloroform > n-hexane and butanol > chloroform > hexane > ethyl acetate for *A. indicum* and *Abutilon muticum*, respectively. The reaction kinetics with this free radical indicated the presence of both slow reacting and fast reacting anti oxidant components in the extracts of both plants. The results obtained in the present study indicate that both *Abutilon* species are potential sources of natural antioxidants.<sup>[19]</sup>

### Diuretic Activity

The diuretic effect of *Abutilon indicum* Linn. Seed extract was evaluated in rats. Diuretic and Natriuretic activities were carried out by administration of normal saline along with the treatment modules. The volume of urine ( in ml) and the Na<sup>+</sup> and K<sup>+</sup> content in the urine were measured .The extract at 200 and 400mg/kg, produced significant diuresis and increased sodium elimination but not potassium.<sup>[20]</sup>

### Antifungal Activity

A new steroidal compound 20, 23-dimethylcholesta-6, 22 dien-3 $\beta$ -ol has been isolated from the stem tissues of *A.indicum*. The structure of the compound was elucidated by spectral and chemical studies. The compound was elucidated by spectral and chemical studies. The compound was found to be 100% effective at 5000 ppm in controlling the mycelia growth of *Aspergillus terreus* var. aureus and *Aspergillus parasiticus* var. globosus using the poison food technique. For other fungi like *A.versicolor*, *A. Flavus*, and *A. fischeri*, it was fungistatic.<sup>[21]</sup>

### Cardio protective Activity

The ethanolic extract of the roots obtained from *A. indicum* was evaluated for protection against Isoproterenol (150mg/kg body wt, s .c.) induced myocardial infarction in male Wistar rats. Isoproterenol induced rats showed significant elevation in the levels of serum marker enzymes such as Creatinine Kinase-MB, Lactate dehydrogenase (LDH) Aspartate transaminase (AST) and Alanine transaminase (ALT) with significantly increased lipid peroxidase and significant decrease in anti oxidant parameters viz., Super oxide dismutase (SOD), Catalase (CAT) and Glutathione peroxidase (GP<sub>x</sub>) in heart homogenate and also



increased serum uric acid level. Oral pretreatment with ethanolic root extract of *A. indicum* (100mg/kg body wt) daily for a period of 28 days, reduced significantly the elevated the levels of SOD, CAT and GPx in the heart homogenate and decreased serum uric acid level. Histopathological observation also revealed a marked protection by the extract in myocardial necrotic damage. Our results show that treatment with ethanolic root extract of *A. indicum* (100mg/kg body wt) was safe and highly effective in preventing cardiovascular dysfunction in rats.<sup>[22]</sup>

These properties can be compared with each other as follows

Sr.No.	Ayurvedic Properties	Modern Properties
1.	<i>Grahi</i>	Anti diarrhoeal Activity
2.	<i>Kasaghna</i>	Anti asthmatic Activity
3.	<i>Balya</i>	Immunomodulatory activity
4.	<i>Vranropan</i>	Wound healing Activity
5.	<i>Dahashamak</i>	Anti ulcer Activity
6.	<i>Vathar</i>	Anti arthritic Activity
7.	<i>Vedna shamak, Shothhar</i>	Analgesic and Anti inflammatory Activity
8.	<i>Krimighna</i>	Larvicidal Activity
9.	<i>Pramehghna</i>	Anti diabetic Activity
10.	<i>Panduhar</i>	Antioxidant Activity
11.	<i>Mutra virechak</i>	Diuretic Activity
12.	<i>Kushthaghna</i>	Antifungal Activity
13.	<i>Hridya</i>	Cardio protective Activity

## DISCUSSION

The Ayurvedic references shows that the plant *Atibala* possesses *Rasayan, Kashar, Vednahar, Vajikar, Krimighna, Grahi, Vathar, Varnya, Dahashamak, Vishaghna, Kandughna, Kushthaghna, Balya, Tridosh shamak, Klednashak, Mridu virechak* properties. While the properties according to studies regarding *Atibala* in modern era are Anti estrogenic activity, Anti diarrhoea activity, Anti asthmatic activity, Immunomodulatory activity, Wound healing activity, Anti ulcer activity, Hepatoprotective activity, Anti arthritic activity, Hypoglycemic activity, Lipid lowering activity, Analgesic and Anti inflammatory activity, Larvicidal activity, Anti diabetic activity, Anti oxidant activity, Antifungal activity, Cardioprotective activity.

## CONCLUSION

The literary study of *Atibala* from ayurvedic texts and modern researches concludes that *Atibala* i.e. *Abutilon indicum* has following properties according to ayurveda *Rasayan, Kashar, Vednahar, Vajikar, Krimighna, Grahi, Vathar, Varnya, Dahashamak, Vishaghna,*



*Hridya, Kandughna, kushtghna, Balya, Tridoshshmak, Klednashak, Mriduvirechak*, and according to modern are anti estrogenic activity, anti diarrheal activity, antiasthmatic activity, immunomodulatory activity, wound healing activity, anti ulcer activity, hepatoprotective activity, anti arthritic activity, hypoglycemic activity, lipid lowering activity, analgesic and anti inflammatory activity, larvicidal activity, anti diabetic activity, anti oxidant, diuretic activity, anti fungal activity, cardioprotective activity.

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