



## TRIDAX PROCUMBEN LINN: PHARMACOLOGICAL ACTIVITIES AND THEIR TRADITIONAL USE

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### ABSTRACT

India has been blessed with an abundance of medicinal herbs primarily because of the country's climate and seasons, which promote the growth of various plant species. *Tridax procumbens* is a typical medicinal herb that is generally found in India as a weed and pest plant. It is classified as part of the Asteraceae family and is commonly referred to as Coat Button, Kansari (Hindi), or Ghamara (local language). The most valuable medicament utilized for the manufacturing of compounds described in Ayurvedic literature is *Tridax procumbens*. It is mostly used as an anticoagulant, an antifungal, and a wound healing agent insect repellent, dysentery and diarrhoea in Indian traditional remedies. And their extract has various pharmacological properties (anti-inflammatory, hepatoprotective, immunomodulating, antimicrobial or antibacterial, antiseptic, anticancer, repellent, hemostatic, antidiabetic, urolithiasis, blood pressure lowering, antioxidant, bradycardia, etc.). The chemical components of the plant showed that its leaves contain various alkaloids, flavonoids, carotenoids, fumaric acid, etc. The synthesis of aromatic substances in the plant results in its primary secondary metabolites, such as the phenol derivative and oxygen oxidation. It is also active against antimicrobial agents such as gram-positive and gram-negative bacteria. It is also used as an adsorbent for chromium. Here we try to focus on the broad phytochemical and pharmacological activities of *Tridax Procumbens*.

**KEYWORDS:** *Tridax Procumbens*, Phytochemical, Pharmacological Plant Extracts, coat button, Pharmacological activities.

### INTRODUCTION

*Tridax procumbens* could be a species of blossoming plant within the daisy (Asteraceae) family. It is best known as a broad weed and bug plant. The plant is local of tropical America and naturalized in tropical Africa, Asia, and Australia. It could be a wild herb dispersed all through India. It is yearly or biennial to some degree patently hispid herbs. Stem branched, inching at base, sub erect or trailing over. *Tridax procumbens* is found to have pharmacological exercises like hepatoprotective impact, immunomodulating property, promising wound recuperating movement, antidiabetic, hypertensive impact, antimicrobial, creepy crawly repellent action, against incendiary and antioxidant, bronchial catarrh, diarrhoea, loose bowels moreover anticipate falling of hairs and leads to hair development advancement.<sup>[1]</sup>

*Tridax procumbens* was also tested for biological activity in one of the most complete screening of Indian plants.<sup>[2]</sup>

This biological screening included tests for antibacterial, anticancer, antifertility, antifungal, anti helminthic, anti protozoal, antiviral and pharmacological activities, but the detailed results were not given and further

fractionation for confirmatory tests was not undertaken, due to apparently insignificant biological activity. More recently, a pool of plants was tested in Nepal for antimicrobial activity.<sup>[3]</sup> Flavonoids, fundamental oils, saponins, tannins, steroids, alkaloids, carbohydrates, carotenoids, terpenoids, and other chemical substances have been separated and recognized from this species.<sup>[4]</sup>

### DESCRIPTION

*Tridax procumbens* is best known as a far reaching weed and bother plant. *T. procumbens* is additionally known as 'Mexican daisy' (in Mexico), 'Coat button' and 'Tridax daisy' (in English), 'Jayanti Veda' (in Sanskrit), 'Gharma' (in Hindi), 'Dagadipala' (in Marathi), 'Vettukkaaya-thalai' (Tamil/Siddha) and 'Akala kohadi' (in society).<sup>[4]</sup>

### Macroscopic characters of leaf, flower, stem and root Leaf

Leaves are 3-6 cm long and 1-4 cm wide, lanceolate to ovate shaped, hairy, opposite, often deeply lobed with irregularly toothed margin and an acute apex. Flowers were of two types, disc flowers, the corolla

narrowcampanulate, 8 mm long, bright yellow and hairy at the top, with spreading pappus of plumose hairs. Ray flowers 5 or 6, female, with narrow corolla tube and brown ligulate limb, white or pale yellow, flowering and

fruiting throughout the year. The Stem was herbaceous, cylindrical, decumbent and branched. *Tridax procumbens* having a tap root system.<sup>[5]</sup>

### Classification

Kingdom	Plantae – Plants
Sub kingdom	Tracheobionta – Vascular plants
Division	Spermatophyta
Class	Magnoliopsida – Dicotyledons
Subclass	Asteridae
Order	Asterales
Family	Asteraceae – Aster family
Genus	<i>Tridax</i> L. – tridax
Species	<i>Tridax procumbens</i> L. – Coat buttons

### Synonym

Hindi	Khal muriya, Tal muriya, Ghamra
Sanskrit	Jayanti
Veda English	Coat buttons, <i>Tridax</i> Daisy, Wild daisy
Oriya	Dagadi pala
Marathi	Gaddi Chemanthi
Tamil	Vettukaya thalai, Thatha
Telugu	Gayapu aku, Gaddi chamanthy or Palaka aku.



Fig 1. Whole Plant



Fig 2 . Tridax Flower



Fig 3 . Tridax Leaves

### CHEMICAL CONSTITUENTS

The phytochemical study revealed presence of flavonoids, carotenoids, alkaloids, tannins and saponins. The adjacent profile shows that the plant is rich in sodium, potassium and calcium.<sup>[6]</sup> Leaf of *Tridax procumbens* mainly contains proteins, fiber, carbohydrates, and calcium oxide. Whereas the fumaric acid and tannin has also been reported in the plant.<sup>[7]</sup> Oleanolic acid was obtained in good amounts from *Tridax* and found to be a potential antidiabetic agent when tested against a glucosidase.<sup>[8]</sup> A number of chemical constituent were reported from the plant that are alkaloids, flavonoids, carotenoids, fumaric acid, lauric acid, tannins etc. The medicinal values of the plants depend on the presence of certain chemical substances (secondary metabolites) that are involved in production of different kinds of effects on human body.

Some compounds are responsible to give plants the irs pecificodorsando ther sare responsible for imparting different colours to plants.<sup>[9]</sup>

### TRADITIONAL USES

*Tridax procumbens* has been extensively utilized in the Ayurvedic system of medication and is well-accepted medicine for a liver disorder. It's been found to possess significant medicinal properties against malaria, dysentery, diarrhoea, bronchial catarrh, blood pressure, hair fall, stomach ache, headache and hair fall. It also has wound healing properties and check hemorrhage from cuts and bruises. Antiseptic, insecticidal and parasiticidal properties were reported in flowers and leaves. The plant also possesses immunomodulatory, antidiabetic, antihepatotoxic and anti-oxidant, anti-inflammatory, analgesic activity.<sup>[10-11]</sup> Traditionally, *Tridax procumbens*

has been in use in India for wound healing and as an anticoagulant, antifungal, and insect repellent. The juice extracted from the leaves is directly applied on wounds. Its leaf extracts were used for infectious skin diseases in folk medicines. It is used in Ayurvedic medicine for liver disorders, hepato protection, gastritis, and heartburn. *Tridax procumbens* is also used as treatment for boils, blisters, and cuts by local healers in parts of India.<sup>[12]</sup>

## PHARMACOLOGICAL ACTIVITIES

### Antimicrobial activity

The methanolic and ethyl acetate extracts of *Tridax procumbens* were tested against various bacterial species using Disc diffusion and Agar well diffusion methods. The ethyl acetate extracts were more effective than the methanolic extracts in both methods. The ethyl acetate extract showed greater zone of inhibition against *Staphylococcus aureus*, *Salmonella typhi* and *Bacillus cereus* species, whereas, in the methanolic extract of *Tridax procumbens*, only *Escherichia coli* showed significant zone of inhibition, in disc diffusion method. In agar gel diffusion method, methanolic extract of *Tridax procumbens* showed antimicrobial activity for *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella typhi* and *Escherichia coli* and the ethyl acetate extract showed significant zone of inhibition against *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Escherichia coli* and *Bacillus cereus*. *Tridax procumbens* leaf, extracted with ethyl alcohol is found to be most effective as an antimicrobial agent against *Pseudomonas vulgaris*. The ethanolic extract showed very good antibacterial activity against gram negative, non-fermenting multidrug resistant *Pseudomonas* isolated from nosocomial infections may be due to the presence of phytoconstituents such as flavonoids and tannins have several mechanisms of action such as inhibition of DNA gyrase, inhibition of cytoplasmic membrane function, and inhibition of energy metabolism.<sup>[13]</sup>

### Antifungal activity

The antifungal activity of *T. procumbens* may be due to the presence of many bioactive compounds such as, phenols, flavonoids, saponins, sterols and fatty acids. The essential oils obtained from the flowers of *Tridax procumbens* L. were found to be active against the tested fungi.<sup>[14]</sup> Methanol extract fractionated with dichloromethane have produced zones of inhibition ranging from 17 to 25 mm against various fungal strains including *Microsporum fulvum* (MTCC 8478), *Microsporum gypseum* (MTCC 8469), *Trichophyton mentagrophytes* (MTCC 8476), *Trichophyton rubrum* (MTCC 8477) and *Candida albicans* (MTCC 854). Among all other species *C. albicans* was highly susceptible. The anti-dermatophytic activity of the DCM fraction may be attributed to the presence of unsaturated fatty acids, 5-cholestane and different siloxanes.<sup>[15]</sup> *Tridax procumbens* also possesses antifungal property against three phytopathogenic fungi i.e. *Helminthosporium oryzae*, *Rhizoctonia solani* and

*Pyricularia oryzae*. The flowers also have excellent inhibitory potential against the tested plant pathogen, *Fusarium oxysporum*. Free flavonoids and sterols of *T. procumbens* (flower) have also completely inhibited the spore germination of the fungi.<sup>[16]</sup>

### Anti-cancer activity

Aqueous and acetone flower extract of the traditional plant *Tridax procumbens* were tested on Prostate Epithelial Cancerous Cells PC-3, determined by measuring cell viability by MTT assay. The inference of the experiments was the cleavage of the soluble yellow coloured tetrazolium salt MTT [3-(4, 5-dimethyl - thiazole-2- yl)-2, 5-diphenyl tetrazolium bromide] to a blue coloured formazan by the mitochondrial succinate dehydrogenase. The assay relies on the capability of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple-blue insoluble formazan precipitate which is then quantified spectrophotometrically at 570nm. The results of these studies showed that the flower crude extract of the plant *Tridax procumbens* possesses vital anti-cancer activity.<sup>[17]</sup>

### Antidiabetic activity

Alpha amylase and alpha glucosidase are responsible for the hydrolysis of poly and oligosaccharides into monomers or cleavage of bonds between sugars and non-carbohydrate aglycone. These enzymes are involved in the digestion of carbohydrate into glucose or processing of the oligosaccharide moieties of glycoprotein. The methanolic extract of *Tridax procumbens* has the potential to reduce postprandial glucose levels via  $\alpha$ -amylase inhibitory action. The retardation of membrane bound  $\alpha$ -amylase inhibitory reaction or inhibition of passive glucose transport can flatten the postprandial blood glucose excursions or reduce hyperglycaemia. The alpha amylase activity of the methanolic extract of *Tridax procumbens* may be due to the presence of Quercetin. The administration of aqueous and alcoholic extracts from the leaves of *Tridax procumbens* (200 mg/kg) orally for 7 days produced a significant decrease in the blood glucose level in the alloxan-induced diabetic rat model.<sup>[18]</sup>

### Anti-Hepatotoxic or Hepatoprotective activity

Jude ChigozieIkwuchi et.al screened the potential of an aqueous extract of the leaves of *Tridax procumbens* to protect against carbon tetrachloride-induced liver injury in Wistar albino rats. The carbon tetrachloride was prepared in olive oil and administered subcutaneously at 1 ml/kg body weight. The extract was administered to normal and carbon tetrachloride treated rats at 100, 200, and 300 mg/kg. Treatment dose-dependently significantly lowered ( $P < 0.05$ ) alkaline phosphatase (54.91-100.52%), aspartate transaminase (37.74-64.79%), and alanine transaminase (32.96-57.82%) activities as compared to test control. The plasma total bilirubin and total protein levels of the treated animals were lower although not considered significant. The

results of this study indicated that treatment with the plant extracts protects the liver against carbon tetrachloride-induced hepatotoxicity; therefore, the study suggests the use of *T. procumbens* in African tradition for the treatment of liver problems.<sup>[19]</sup>

#### Wound healing activity

B. Yaduvanshi *et al.* investigated the wound healing activity of topical ointment formulation of the leaf juice of *Tridax procumbens* using excision wound model in mice. Excision wounds (4 mm, i.d.) were inflicted on depilated back of mice. Ointment formulation of *Tridax procumbens* (50 mg of either 1 or 4 mg/g) was applied twice daily for 4 days on the dermal wound. Control group was treated with VEGF ointment (50 mg of 1 µg/g). Various parameters like re-epithelization, vascularity, fibroblast number, collagen content was observed. The healing potential of *Tridax procumbens* (1 mg/g) was compared with the control group. The results of this investigation revealed that *Tridax procumbens* possesses dose-dependent pro-healing potential, and its high dose exerts an inflammatory reaction.<sup>[20]</sup>

#### Anti-ulcer activity

The antiulcer activity of methanolic extracts of *Tridax procumbens* was screened by Aslam Pathan *et al.* During this study albino rats were treated with methanol extract 100 mg/kg of *Tridax procumbens* Linn and ulcer protection activity using myeloperoxidase activity was evaluated. The results revealed that the myeloperoxidase activity of methanol extract 100 mg/kg (2.74 U/g) is lower than experimental control (4.74 U/g). From this study, it can be concluded that the methanolic extract (100 mg/kg) of the whole plant of *Tridax procumbens* Linn possesses ulcer prevention and protection activity and should be helpful for the hindrance of ulcerative colitis.<sup>[21]</sup>

**Leishmanicidal activity:** In vitro activity of methanolic extract of *T. procumbens* inhibited promastigotes growth of *Leishmania mexicana* which is a causative agent of cutaneous leishmaniasis disease with a 50% Inhibitory Concentration (IC<sub>50</sub>) at 3 µg/ml, showing its anti-leishmanial activity.<sup>[22]</sup>

**Analgesic and Anti-inflammatory activity:** V Vinoth Prabhu *et al.* investigated the analgesic and anti-inflammatory activity of the aqueous and ethanolic extracts of the plant *Tridax procumbens* by two analgesic and one inflammatory in-vivo pain models using male C57 BL6/J mice (25-30g) and male Sprague-Dawley rats (150-230g). In the formalin-induced pain test, late phase of moderate pain, which starts about 20 min post formalin injection and lasts about 40 min to 60 min, may be caused due to tissue and functional changes in the dorsal horn of the spinal cord. Treatment with extract produced significant inhibition of pain in the late phase. In the acetic acid-induced abdominal constriction test, treatment with extract showed a dose-dependent reduction in the abdominal writhing significantly. In CFA

Induced Hyper analgesia, oral administration of *Tridax procumbens* extract significantly reduced mechanical hyper analgesia in CFA injected rats. These results revealed that *Tridax procumbens* has markedly significant effects against centrally, peripherally and inflammatory pain models and the protective actions may be due to the presence of flavanoid and sterol.<sup>[23]</sup>

#### Antirolithiatic and anti-oxidant activities

A renal stone formation is one of the known urological disorders. Hyperoxaluria and hypercalciuria are the major risk factors for renal stone formation. Hence oxalate exposure is toxic to renal epithelial cells and responsible for oxidative stress. Anti urolithiatic activity of the ethanolic extract of the whole plant of *Tridax procumbens* Linn against 0.75 % v/v ethylene glycol and 2% w/v ammonium chloride induced calcium oxalate renal stones and also antioxidant activity against hyperoxaluria induced oxidative stress in the male albino rat were evaluated in this study. Increase in oxidative stress and increased urinary calcium, oxalate and creatinine were observed after ethylene glycol and ammonium chloride administration in control rats. Calcium oxalate crystal depositions and extensive renal tubular damage were noticed by histopathology studies of kidneys. Treatment of the ethanolic extract of *Tridax procumbens* to the test rats decreases the increased levels of urinary calcium, oxalate and creatinine and significantly lowered deposition of calcium and oxalate in the kidneys. Substantial reduction in oxidative stress was also observed. Renal histology showed a marked reduction in calcium oxalate crystal depositions. This study shows the Antirolithiatic and anti-oxidant activities of the plant *T. Procumbens*.<sup>[24]</sup>

#### Immunomodulatory Activity

Immunomodulatory activity of an ethanol-insoluble fraction of aqueous extract of *Tridax procumbens* was reported in this study. In this Study, Swiss albino rats were treated with *Pseudomonas aeruginosa*. Rats were divided into six groups of four per group. The first group was treated with the standard inoculum of *Pseudomonas aeruginosa* only and the second group was given 8 mL of the standard inoculum of the organism and treated with ethanolic extract of *Tridax procumbens*. The third category was treated with the ethanolic extract of *Tridax procumbens* only, whereas normal saline was administered to the last group. From the results, it was noticed that the phagocytic index, leukocyte count and splenic antibody secreting cells increases significantly. The immunomodulatory potential of ethanolic extracts of leaves of *Tridax procumbens* was also evaluated against *Pseudomonas aeruginosa* induced albino rats and was found that the extracts have the ability to inhibit the proliferation of *Pseudomonas aeruginosa*.<sup>[25]</sup>

#### Anti-arthritis activity

This study was conducted to assess the anti-arthritis activity of whole plant ethanolic extract of *Tridax procumbens* using Freund's Complete Adjuvant

(FCA) model. Here arthritis was induced using FCA, and the anti-arthritic effect of the ethanolic extract of *Tridax procumbens* was evaluated at doses of 250 and 500 mg/kg and the effects were compared with indomethacin (10 mg/kg). At the end of the investigation, the liver

enzyme levels were determined and a radiological examination was carried out. The study implies that *Tridax procumbens* at a dose of 250 and 500 mg/kg significantly inhibited FCA-induced arthritis in the rats.<sup>[26]</sup>

#### MARKETED PREPARATION

Sr.no	Formulation	Brand name	Uses	Images
1	Gel	Himalaya Herbals	<ul style="list-style-type: none"> <li>Wound healing</li> </ul>	
2	Cream	DEW FINE LABORATORIES	<ul style="list-style-type: none"> <li>Treatment of inflamed piles</li> </ul>	
3	Oil	SAHAJA OUSHAD	<ul style="list-style-type: none"> <li>Treatment of skin allergy</li> <li>Treatment of Skin Iching</li> </ul>	
4	Capsule	INDONESIAN HERBAL	<ul style="list-style-type: none"> <li>Lower High Blood Pressure</li> <li>Increase Stamina</li> </ul>	
5	Oil	GHAMARA	<ul style="list-style-type: none"> <li>Hair growth</li> <li>Prevent Hair falling</li> </ul>	

#### CONCLUSION

*Tridax procumbens* contains a number of valuable constituents such as flavone glycoside, chromone glycoside, bithiophenes, flavonoid (procumbenetin), sterols, terpenoids, lipids and polysaccharides, phenolic content, tannins, catechins, and various secondary metabolites with significant pharmacological activities such as antiinflammatory, antibacterial, wound-healing, and antioxidant activity, anti-cancer, antistaphylococcal, apoptotic effect. Apart from this, it also possesses antimicrobial and immunomodulatory action, which provides the basis for further studies.

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