


**A COMPREHENSIVE REVIEW OF A HEALING HERB: *TRIDAX PROCUMBENS* LINN.**
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**ABSTRACT**

Nature has been a source of medicinal agents for thousands of years and an impressive number of medicinal drugs have been isolated from natural resources. It is now a known fact that nature has given cure of every disease in one way or another but the only need is to explore them wisely. So the researchers today are emphasizing on evolution & characterization of various plants & plant constituents against different diseases. The essential uses of many plants have been worked out & published but many useful and valuable plants are still unexplored upto date. One such plant/drug is *Tridax procumbens* Linn commonly called as *coat button* in English and *Ghamra* in Hindi. Though it has been used in folklore practices for hundreds of years but still it is considered a useless weed in many parts of the world. It is a multifaceted weed available throughout the continent which can act as a substitute for many herbs. The present endeavour is an attempt to analyse the updated information of *Tridax* identification, phytochemical, pharmacognostic study and its pharmacological activities like hepatoprotective activity, antimicrobial activity, immunomodulating property, defluoridation activity, hypotensive action, anti viral action, anti oxidant action, antiurolithiatic action and anti inflammatory action to serve the ailing mankind by its magical action.

**KEYWORDS:** *Tridax procumbens*, *Coat button*, *Ghamra*.

**INTRODUCTION**

India is a country where rich culture, folk medicine & nature go hand in hand. India is blessed with such a wide spread folk medicine called *Tridax procumbens* Linn commonly known as "*Ghamra*" & in English popularly known as *coat buttons* because of the resemblance of its flowers with coat buttons. This plant of *Asteraceae* family was introduced in China in 1940.<sup>(1)</sup>

It reflects all the characters of *Asteraceae* family & shows very much resemblance to one of the member of this family called *Eclipta alba* or *Bhringraja*. Its morphological features, anatomical features, part used, action & mode of action resembles very much with *Eclipta alba*. Though clear description of *Tridax procumbens* is not given in *Samhitas* but in various *Nighantus* it is referred as a species of *Bhringraja*.

In *Shodhal Nighantu* two varieties of *Bhringraja* are described a *Pita Bhringraja* (Yellow flowered) & *Sveta Bhringraja* (white flowered). Yellow types denoted as *Avanti* & described as *Wedalia calendulacia* & white flowered denoted as *Jayanti* & described as *Tridax procumbens* by *Acharya Shodhal*.

In *Madanpal Nighantu* three varieties of *Bhringraja* are defined as *Peeta*, *Neela* & *Sveta bhringraja* where *Sveta bhringraja* is itself called *Eclipta alba* & *Peeta bhringraja* is called as *Wedelia calendulacea* & *Tridax procumbens* Linn.

In *Nighantu Adarsha* three varieties are described as black, red & white coloured along with description of *Pardesi Bhringaraja* called as *Tridax procumbens*.

So, though there is a little controversy in our *Nighantu granthas* but collectively they have accepted

*Tridax procumbens* as a variety of *Eclipta alba*, along with the description of many of its useful action or *Karma*. In modern texts also, all the characters of *Tridax procumbens* are similar to that of white flowered (3 ray florets) procumbent herb which we are considering as *Sveta/Pita/Sveta-pita Bhringraja* i.e., *Bhringaraja* with creamish yellow flowers.

*Tridax procumbens* is a herb present throughout India & is employed as indigenous medicine for variety of ailments. It is found to possess significant medicinal properties against blood pressure, headache, stomach ache, wound healing, diarrhoea, dysentery etc. It also prevents hair fall & its leaves & flowers possess antiseptic, insecticidal & parasiticidal properties.<sup>(2,3)</sup> The present review is aimed to notice biological & medicinal activity of *Tridax* & introducing such unnoticed herb for inclusion in *Ayurveda Medica* to serve the ailing mankind.

**Classification<sup>(4)</sup>**

The plant classification details are

Kingdom:- Plantae- Plants

Sub-kingdom :- Tracheobionta- Seed Plants

Division:-Magnoliophyta- Flowering plants

Class:- Magnoliopsida- Dicotyledons

Sub class:- Asteridae

Order:- Asterales

Family:- *Asteraceae*- Aster Family

Genus :- *Tridax* L-*Tridax*

Species:- *Tridax procumbens* (L) coat button.

**Properties<sup>(4)</sup>**

Ayurvedic Properties of *T. Procumbens* are-

*Rasa* - *Kashaya*, *Amla*, *Tikta*

*Guna* - *Guru, Snigdha*

*Virya* - *Seeta*

**Vernacular Names<sup>(11)</sup>**

**Region/language**

**Vernacular names**

English - *Coat button/Tridax daisy*

Hindi - *Ghamra*

Sanskrit - *Jayanti Veda*

Oriya - *Bishalya Karani*

Marathi - *Dagadi Pala*

Telugu - *Gaddi Chemanthi*

Tamil - *Thata Poodu*

Malayalam - *Chiravanak*

Spanish - *Cadillip Chisaca*

French - *Herbe caille*

Chinese - *Kotobukigiku*

Latin - *Tridax Procumbens* Linn.

**Botanical Description<sup>(5)</sup>**

**Habitat**

The plant is native of tropical America & naturalized in tropical Africa, Asia, Australia & India. It is a wild herb distributed throughout India. Coat buttons are found along roadsides, waste grounds, dikes, railroads, riverbanks, meadows & dunes. Its widespread distribution & importance as a weed are due to its spreading stem & abundant seed production.

*Tridax procumbens* is a perennial plant or herb with short, hairy blade like leaves. It is semi prostrate, annual creeper herb which ascends upto a height of 30-50 cm. Its stem is branched, sparsely hairy with rooting at nodes. It is tap rooted & on attempt to pull out plant breaks.<sup>(6)</sup>

**Morphological Description**

**Leaves-** Leaves are simple, opposite, entire, hairy, rarely pinnatisect, exstipulate and shortly petioled. Leaf shape is lanceolate-ovate with wedge shaped base and acute apex. It is 3-7 cm long 4.5 cm with long irregularly toothed margin.

**Flowers-** It flowers throughout the year in long peduncled heads. Flowers are small, tubular, whitish-yellow with hairs. Inflorescence is capitulum. It bears two types of flower-ray florets & disc florets with basal placentation.<sup>(7)</sup>

Disc florets are corolla narrow- campanulate 8 mm long, bright yellow & hairy at the top with spreading pappus of plumose hair.

Ray florets 5 or 6 female with narrow corolla tube & brown ligulate limb, white or pale yellow in colour.<sup>(8)</sup>

**Fruit-** Fruit is a hard achene covered with stiff hairs & having a feathery, plume like white pappus at one end. The plant is invasive in part because it produces so many achenes & each achene can catch the wind in its pappus & can be carried to some distance. Achenes are 1.5-2.5 mm long X 0.5-1 mm in diameter.

**Seeds-** Seeds have pendulous embryo, endosperm is absent.

**Stem-** Stem is herbaceous, cylindrical, decumbent &

branched.

**Root-** *T. procumbens* has a tap root system.

**Part Used-** Whole plant (leaf, stem & flowers) is used to cure different ailments.

**Chemical Constituents**

Flavanoid (procumbenetin) isolated from the aerial parts of *Tridax procumbens* has been characterized as 3, 6 -dimethoxy-5, 7, 2', 3', 4'- pentahydroxy flavone 7-0-β-D-glucopyranoside<sup>1</sup> on the basis of spectroscopic techniques & by chemical means.

Isolation of methyl 14 oxoacagaecunoate, methyl 14- oxononacosanoate, 3-methyl-non adecylbenzene, hepatocosanyl cyclohexane carboxylate, 1- (2, 2, dimethyl-3-hydroxy propyl)-2- isobutyl phthalate, 12-hydroxytetracosanoic acid, 32-methyl-30-ozotetraatria cont-31-en-1-ol along with β amyryn, β amyryone, fucosterol & sitosterol, arachidic, behenic, lauric, linoleic, linolenic, myristic, palmitic & stearic acids have been isolated<sup>(9)</sup>.

It is also a potential source of the protein supplements & pro vitamin A (carotenoid).<sup>(10)</sup>

**Pharmacological Activity**

**1. Hepatoprotective activity**

Its hepatoprotective action was seen in d-Galactosamine/Lipopolysaccharide (d-Gal N/LPS) induced rats. d-Gal N/LPS are hepatotoxic by its action of destroying liver cells. It selectively blocks the transcription & indirectly hepatic protein synthesis causing endotoxin toxicity & leading to fulminant hepatitis within 8 hrs of administration.<sup>(12)</sup>

The results revealed that *T. procumbens* could afford a significant protection in the alleviation of d-Gal N/LPS-induced hepatocellular injury.

**2. Immunomodulatory activity**

Albino rats dosed with *Pseudomonas aeruginosa* when administered with ethanolic extract of leaves of *Tridax* showed stimulation of humoral immune response along with elevation in hemagglutination antibody titer. It also inhibited proliferation of *P. aeruginosa* along with significant increase in phagocytic index, leukocyte count & splenic antibody secreting cells.<sup>(13)</sup>

**3. Wound healing activity**

*Tridax* opposed antiepithelization & tensile strength depressing effect of dexamethasone (a well known healing suppressant agent) without affecting anticontraction & antigranulation action of dexamethasone. Aqueous extract was also effective in increasing lysyl oxidase, but to a lesser degree than whole plant extract. Further, it has been shown that extract of leaves of *T. procumbens* promotes wound healing in both normal & immunocompromised (steroid treated) rats in dead space wound healing model. The plant increases not only lysyl oxidase but also, protein & nucleic acid content in the granulation tissue, probably as a result of increase in glycosaminoglycan content.<sup>(14)</sup>

**4. Antidiabetic activity**

Aqueous & alcoholic extract of leaves of *Tridax*

showed a significant decrease in the blood glucose level in the model of *alloxan* induced diabetes in rats.<sup>(15)</sup>

#### 5. Anti microbial activity

Whole plant of *Tridax* has reported for its anti microbial activity on various species of bacteria. Fresh plant juice when applied twice a day for 3-4 days cures cuts & wounds. Whole plant extract when used against 4 strains of bacteria – 2 gram positive-*Bacillus subtilis*, *Staphylococcus aureus* & two Gram negative *Escherichia coli* & *P. aeruginosa* showed anti bacterial activity only against *P. aeruginosa*.<sup>(16)</sup>

*Tridax procumbens* also possess antifungal property against three phytopathogenic fungi i.e. *Helminthosporium oryzae*, *rhizoclonea solani* & *pyricularia oryzae*.<sup>(17)</sup>

Methanolic extract of leaves of *T.procumbens* were found to be active against two tested fungi (*A. niger* and *A. ocraceous*). The fungal strain of *A. niger* and *A. ocraceous* shows zone of inhibition 13mm and 12mm respectively where positive control (ciprofloxacin) produced zone of inhibition 11mm and 10mm respectively.<sup>(18)</sup>

The n-hexane extract of the flower showed activity against *E. coli*. The same extracts of whole aerial part was active against *Mycobacterium smegmatis*, *E-coli*, *Salmonella paratyphi* & *Staphylococcus aureus* while aqueous extract showed no antimicrobial activity.<sup>(19)</sup>

Among the various karmas defined of *Tridax procumbens*, it's antimicrobial action, in present era when man is surrounded by countless microorganism & human body has become resistant to many of the strains of bacteria & fungi, has emerged as a new ray of hope.

#### 6. Defluoridation action

Fluoride though acts as a protective agent for teeth but when in excess it is harmful to health. Recently, researchers in India have developed a filter system based on medicinal herb, which can quickly & easily remove fluoride from drinking water. *T. procumbens* a medicinal herb in India, previously was tested for extraction of toxic heavy metals from water. *Singan* has suggested that this medicinal herb can be used as a biocarbon absorbent for fluoride. He explained that by loading up plant tissue with aluminium ions, it is possible to create a safe bio carbon filter that will readily absorb fluoride ions from water warmed to around 27° C passing through filters. His trial also showed that it takes just 3 hrs to remove 38% of fluoride with just 2g of the bio carbon filter. So this bio carbon filter might provide an inexpensive way to defluoridate water in region where natural level of this mineral is high in ground water including China, India, Sri Lanka, Italy, Spain, Mexico, Holland, West Indies, North & South America.<sup>(20,21)</sup>

#### 7. Anti Viral activity

The therapeutic potential of *T. procumbens* L. extracts were screened for antitrypanosomal properties in mice infected with *Trypanosoma brucei* by *Abubakar* et al & found insufficient anti trypanosomal activity, though stated that the modification of the

detected phenolic compound may generate effective antitrypanosomal drug.<sup>(22)</sup>

#### 8. Anti inflammatory activity

The antinflammatory action of leaf extract of *Tridax* was assessed on carrageenin induced paw edema along with standard drug, Ibuprofen<sup>(27)</sup>. The extract increased the inhibition of oedema if treated with standard drug Ibuprofen. Water soluble powder of leaf extract was administered orally at different doses to rats. The result demonstrated that the extract possesses analgesic activity. *T.procumbens* dose reduced the abdominal writhing.<sup>(23)</sup> Meshram & Patel investigated that alcoholic & hydroalcoholic extracts have anti inflammatory activity using the rat paw oedema assay & showed oedema inhibition 0.82%, 16.80%, 11.39%<sup>(24)</sup>.

#### 9. Antiurolithiatic activity

Ethanollic extract of *Tridax procumbens* L. was used for treating kidney stone disorders. It was evaluated against 0.75% v/v ethylene glycol & 2% v/v ammonium chloride induced calcium oxalate urolithiasis & hyperoxaluria induced oxidative stress in male albino rats. Treatment with the extract was able to reduce calculogenesis induced urinary excretion & renal deposition of calcium oxalate & resultant lipid peroxidation including its antiurolithiatic<sup>(25)</sup> & antioxidant effect.

#### 10. Hypotensive

Cardiovascular effect of aqueous extract of *T.procumbens* leaf was tested on anaesthetized *Sprague Dawley* rat. The aqueous extract caused significant dose dependent decrease in mean arterial blood pressure. The higher dose leads to significant reduction in heart rate whereas lower dose did not cause any change in the same. Thus leaves of *T. procumbens* showed hypotensive effects.<sup>(26)</sup>

#### 11. Repellant activity

In a study, essential oils were extracted by steam distillation from leaves of *T. procumbens* L. & were examined for its topical repellency effects against malaria parasite *Anopheles stephensi* in mosquito cages.<sup>(27)</sup> All essential oils were tested at three diff. concentration (2, 4 & 6 %) of these, the essential oils of *Tridax* exhibited relatively high repellency effect (>300 minutes at 6% conc.) & calculated that *Tridax* are promising as repellent at 6 % conc. against *A stephensi*.<sup>(28)</sup>

#### 12. Anticancerous activity

The activity of *T. procumbens* flower crude aqueous & acetone extract was tested on prostate epithelial cancerous cell. PC3 was determined by measuring cell viability by MTT assay<sup>(29,30)</sup>. Experiment consists of 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 was based on the capacity of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple blue insoluble formazan precipitate which is then

quantified spectro photometrically at 570 nm. <sup>(31,32)</sup>

Linn recommended for bioremediations. <sup>(42)</sup>

### 13. Antioxidant property

Antioxidant prevents the damage done to cells due to free radical molecules released during normal metabolic process. The results of DPPH radical scavenging activity of *Tridax* against test sample & standard (gallic & ascorbic acids (Fluka) shows that *Tridax* possess very high percentage anti oxidant activity, 96.70% at a concentrator of 250 µg/ml. It shows a reductive potential of 0.89 mm. *Tridax* extracts may have hydrogen donors thus scavenging the free radical DPPH with High AA% of 96.70% at 250 µg/ml which was observed to be higher than those of standards (ascorbic & gallic acids) at a conc. of 250 µg/ml used. Thus *Tridax* plants are rich source of natural antioxidant. <sup>(33)</sup>

### 14. Anti arthritic

*Tridax* at 250 & 500 mg/kg has displayed significant anti arthritic activity comparable to that of indomethacin. The ethanolic whole plant extract of *Tridax* exerts an anti arthritic activity by significantly altering the pathogenesis during FCA induced arthritis in female SD rats without exerting any side effect. <sup>(34)</sup>

*Tridax* ethanolic extract showed better results than ethyl acetate extract at 300 mg/ kg comparatively, as *Tridax* ethanolic extract showed significant results ( $P < 0.001-0.05$ ) whereas *Tridax* ethyl acetate extract was less significant ( $P < 0.05$ ) comparing with various groups by one way ANOVA followed by Turkey's multiple comparison test. Rheumatoid factor was found negative in animals of all groups of rat adjuvant poly arthritis. The migration of leucocytes into the inflamed area is significantly suppressed by *Tridax* ethanolic extract when compared to standard drug (Diclofenac sodium, cyclophosphamide) as seen from the significant reduction in total WBC count. <sup>(35)</sup> Earlier findings suggests that absorption of 14-C Glucose & 14-C leucine in rat's intestine was reduced in case of inflamed rats.

### Folk Practice

Though we don't get a description of *T. procumbens* in our *Samhita Granthas* and even *Nighantus* have described it suspiciously but still its medicinal uses are being practiced by folklore for the past ages. Some of them are as follows.

1. In village side it has been used as a medicine to stop hemorrhage from cuts and bruises as anticogulant. <sup>(36)</sup>
2. It is used as an ornamental or fodder plant & its leaves are also cooked as vegetables. <sup>(37,38)</sup>
3. In Nigeria <sup>(39)</sup> *Tridax* is traditionally used in the treatment of fever, typhoid fever, cough, asthma, epilepsy & diarrhoea. <sup>(40)</sup>
4. In west African sub region & tropical zone of the world, traditional medical practitioners & native people of these area uses its leaves as a remedy against conjunctivitis. <sup>(41)</sup>
5. The plant was also used as a good bioadsorbent for the removal of highly toxic ions of Cr (VI) from industrial waste water. Hence *Tridax procumbens*

### CONCLUSION

Thus *T. procumbens* is a plant with its all parts having noble pharmacological activities. Especially antimicrobial action of *T. procumbens* are quiet significant as in the present era continued increase in antibiotic resistance has fuelled the need for development of new antibiotics. Hence the last decade witnessed an increase in the investigations on plants as a source of human disease management and more natural antibacterial and anti fungals have driven scientists to investigate the effectiveness of inhibitory compounds such as extracts of plants. These investigations have opened up the possibility of the use of this plant in drug development for humans and highlightens necessity for further studies to evaluate the use of *T. procumbens* as safe alternative.

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