



Review on the phytochemical and pharmacological activity of *Tridax procumbens* Linn.

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ABSTRACT:

Tridax procumbens Linn., an Ayurvedic herb from Asia with a long history of use, belongs to the Asteraceae family. *Tridax procumbens* has been used in folk medicine to treat wounds, skin diseases, and blood clotting since ancient times. Natural remedies for treating pathogenic and other diseases can be found in medicinal plants. Alkaloids, carotenoids, flavonoids, fumaric acid, flsitosterol, saponins, and tannins were found in the phytochemical screening. Carotenoids, saponins, oleanolic acid, and ions such as calcium, magnesium, potassium, sodium, and selenium are abundant. Antibacterial, antifungal, antioxidant, hepatoprotective, anticancer, antidiabetic, immunomodulatory, wound healing, hypotensive, and other properties of *Tridax procumbens* are well known pharmacologically. This review may be provided information about the traditional uses, phytochemical constituents, and pharmacological activities of *Tridax procumbens*.

KEYWORDS: *Tridax procumbens*, Coat button, Pharmacological activity.

INTRODUCTION:

One of the largest vascular plant families, the Asteraceae, has about 2250 genera and 25000 species worldwide (Shabana *et al.*,2020). *Tridax procumbens* Linn. is one type of common grass seen in the tropics (Sawant *et al.*,2013). *Tridax procumbens* is also known as the 'Mexican daisy' (in Mexico), the 'Coat button' and the 'Tridax daisy' (in English), the 'Jayanti Veda' (in Sanskrit), the 'Ghamra' (in Hindi), the 'Dagadipala' (in Marathi), the 'Vettukkaya-thalai' (Tamil) (Ingole *et al.*,2021). Antibacterial, antifungal, antioxidant, hepatoprotective, anticancer, antidiabetic, immunomodulatory, wound healing, hypotensive etc. pharmacological properties are all present in it (Sawant *et al.*,2013). Pita Bhringraja (Yellow flowered) and Sveta Bhringraja (white-flowered) are two varieties of Bhringraja. Avanti is a yellow type that is described as *Wedelia calendulacea*, and Jayanti is a white-flowered type that is described as *Tridax procumbens* (Safina *et al.*,2017).

Table 1:TAXONOMIC CLASSIFICATION

Kingdom	Plantae
Sub Kingdom	Tracheobionta
Division	Spermatophyta
Sub Division	Magnoliophyta
Class	Magnoliopsida
Sub Class	Asteridae
Order	Asterales
Family	Asteraceae
Genus	<i>Tridax</i>
Species	<i>procumbens</i>

Botanical Name: *Tridax procumbens* Linn.

VERNACULAR NAME:

Language Vernacular name

English: Coat button/Tridax daisy

Hindi: Chamara

Sanskrit: Jayanti Veda

Oriya: Bishalya karani

Marathi: Dogadi pala

Telugu: Gaddi cheamanthi

Tamil: Thata poodu

Malayalam: Chiravanak

Spanish: Cadillip chica

French: Herbe Caille

Chinese: Kotobu kigiku

Latin: *Tridax procumbens* Linn (Ankita et al., 2012).



BOTANICAL DESCRIPTION:

Habitat:

The plant naturally occurs in tropical Africa, Asia, Australia, and India but is originally from tropical America. It is a widely used wild herb in India. Roadsides, landfills, dikes, railroads, riverbanks, meadows, and dunes are all common places to find coat buttons. Its wide distribution, significance as a weed, and a profusion of seeds are caused by its spreading stem. A perennial herb or plant called *Tridax procumbens* has short, blade-like leaves that are hairy. It is an annual creeper herb that grows to a height of 30 to 50 cm. It's branching, sparsely-haired stem roots at the nodes. It is tap-rooted and breaks when you try to pull it out (Chauhan et al., 2008).

MICROSCOPIC DESCRIPTION:

Leaves: Leaves are exstipulate, simple, opposite, entire, hairy, infrequently pinnatisect, and short-petioled. Lanceolate-ovate leaves have an acute apex and a wedge-shaped base. It has a long, irregularly toothed margin and is 3–7 cm long and 45 cm.

Flower: Long peduncled heads of flowers appear all year long. Flowers are tiny, tubular, and hairy in a whitish-yellow colour. Capitulum is inflorescence. It has two different flower types: disc florets with basal placentation and ray florets. The disc florets have a narrow, campanulate corolla that is 8 mm long, bright yellow, and hairy at the top with a spreading plumose pappus. Ray florets 5 or 6 females with a white or light yellow colour and a narrow corolla tube and brown ligulate limb(Rahman *et al.*, 2008).

Fruit: Fruit is a hard achene with stiff hairs covering it and a white pappus that resembles a feather at one end. The plant's profusion of achenes, each of which can catch the wind in its pappus and travel a short distance, contributes to its invasiveness. Achenes have a length of 1.5–2.5 mm and a diameter of 0.5–1 mm.

Seeds: Seeds lack endosperm and have a pendulous embryo (Yadav *et al.*,2011).

Stem: Herbaceous, cylindrical, decumbent, and branched describe the stem.

Root: *T. procumbens* has tap roots (Safina *et al.*,2017).

Plant part: Whole plant (leaf, stem, and flowers) is used to treat a variety of diseases.

The plant's powder microscopy revealed fibres of 175 μm in length, collenchyma cells of 70–115 μm in diameter, glandular trichomes of the stem, latex cells, root cortex cells of the diameter of 80–120 μm , spiral vessels in the leaf, and unicellular covering trichomes of length 200 μm (Kethamakka *et al.*,2014).

TRADITIONAL USE:

Tridax procumbens is a common plant that has a wide range of medicinal uses. It has been used as an anticoagulant, antioxidant, anticancer, immunomodulatory, and wound healing agent in India for centuries. This medicinal plant is commonly used to treat ulcers. It was thought that the decoctions of its leaves had medicinal properties. Infectious skin diseases are treated with ethnomedicine. It is well-known ayurvedic medicine for liver diseases because of the plant (Ghosh *et al.*,2019). Hair growth can be aided by using it (Sawant *et al.*,2013). In addition, the plant is used to treat respiratory problems. It has been used to treat bronchial catarrh, dysentery, malaria, diarrhoea, high blood pressure, and haemorrhage from cuts, bruises, and wounds for centuries (Pareeket *et al.*,2009). It's anti-insect as well as anti-inflammatory. The leaf contains insecticidal and parasitic properties. It's also used to stop bleeding from minor injuries like cuts and bruises (Ghosh *et al.*,2019).

PHYTOCHEMICAL CONSTITUENTS:

Plants contain a variety of phytochemical compounds. This medicinal plant contains alkaloids, carotenoids, saponins, flavonoids, and tannins, according to the phytochemical screening.*Tridax procumbens* have a high sodium, potassium, and calcium content, according to the proximate characteristics (Ghosh *et al.*,2019). The plant's proximate profile reveals that it is high in sodium, potassium, and calcium. *Tridax procumbens* leaves are primarily composed of crude proteins (26%), crude fibre (17%), and soluble carbohydrates (17%). Its flowers contain 39 percent calcium oxide, 5% luteolin, glucoluteolin, quercetin, and isoquercetin. The plant also contains fumaric acid, fl-sitosterol, and tannin (Mundada *et al.*,2010). Its flowers have been found to contain luteolin, glucoluteolin, quercetin, and isoquercetin (Kondawar *et al.*,2019).

PHARMACOLOGICAL ACTIVITY:

Antibacterial activity:

Antibacterial activity has been discovered in *Tridax procumbens* (Taddei *et al.*,2000). In rural areas of the world, it is one of the most commonly used plants for treating bacterial infections(Becket *et al.*,2018).In a previous study, it was discovered that the entire plant parts of *Tridax procumbens* have antimicrobial activity against a variety of bacteria species. To cure cuts and wounds, an entire plant is squeezed between the palms of hands to obtain juice, which is applied twice a day for 4-5 days (Kumar *et al.*,2012). With the help of a disc diffusion assay, the extract of the whole plant only showed antibacterial activity against *Pseudomonas aeruginosa*. Two gram-positive *Bacillus subtilis*, *Staphylococcus aureus*, and two gram-negative *Pseudomonas aeruginosa* and *Escherichia coli*. Only the ethanol extract had this activity against *Pseudomonas aeruginosa* strains(Ghosh *et al.*,2019, Mahato *et al.*, 2005).

Antifungal activity:

Antifungal activity has been demonstrated in *Tridax procumbens* (Beck *et al.*,2018).In a research study, the disc diffusion method was used to determine the antifungal activity of plant decoctions against two fungus strains, *Aspergillus flavus* and *Aspergillus niger*(Jindal *et al.*, 2013). Total activity was determined using minimum inhibitory concentrations and minimum fungicidal concentrations.The flavonoid decoction had the greatest effect on *Aspergillus niger*, while the alkaloide decoction did not affect either of the test fungi (Ghosh *et al.*,2019). *Aspergillus niger* free flavonoid and bound flavonoid of stem and flower both have excellent

antifungal properties. *Tridax procumbens* can be used to make antifungal drug formulations for the treatment of *Aspergillus* and *niger*-related diseases (Kondawar *et al.*, 2019).

Antioxidant activity:

Tridax procumbens ability to reduce D-galactosamine/LPS-induced oxidative stress suggests that it has antioxidant properties. The antioxidant activity of fractions of methanolic extract from the aerial part was tested using the DPPH method. The ethanolic extract of *Tridax procumbens* was found to have antioxidant activity. Natural antioxidants are abundant in plants (Kondawar *et al.*, 2019, Agrawal *et al.*, 2009).

The stable free radical 2, 2-diphenyl-1-picrylhydrazyl (DPPH) was used to measure the free radical scavenging activity of the *Tridax procumbens* fractions and Ascorbic acid in terms of hydrogen donating or radical scavenging ability. The antioxidant activity of the fractions was measured using the IC₅₀, which is defined as the concentration of methanol extract fractions (mg/ml) that indicates a 50% reduction in the formation of DPPH radicals (Ghosh *et al.*, 2019, Chander *et al.*, 2005).

Anticancer activity:

Cancer is a multifaceted illness. *Tridax procumbens* anticancer activity has only recently been investigated. On prostate epithelial cancerous cells, crude flower aqueous and acetone extracts were tested (PC3). The aqueous extract showed very little anticancer activity. Within 24 hours of treatment, the acetone extract had an 82.28% activity against cancer cells (Beck *et al.*, 2018, Vishnu *et al.*, 2011). The mitochondrial succinate dehydrogenase is used to convert the soluble yellow tetrazolium salt MTT to a blue tetrazolium salt formazan. The assay relied on the ability of viable cell mitochondrial enzymes to convert the yellow soluble salt MTT to a purple blue insoluble formazan precipitate, which was then measured spectrophotometrically at 570nm. This research found that flower crude extract has anti-cancer properties (Kondawar *et al.*, 2019). The MTT assay was used to assess the cytotoxicity of plant-derived compounds against a human lung cancer cell line. The compound reduced cell viability by 90%. The compound is Lupeol, according to NMR, MS, and IR spectra (Sankaranarayanan *et al.*, 2013). Clonogenic survival determination, cell cycle control, cell-based assay for inhibition of COX-2 activity, and DNA fragmentation were used to assess the Lupeol's anti-cancer potential against a human lung cancer cell line. The researchers discovered that a concentration of Lupeol compound of 320 µg/ml had significant anti-cancer activity (Ghosh *et al.*, 2019).

Hepatoprotective activity:

D-Galactosamine/Lipopolysaccharide (D-GalN/LPS) induced hepatocellular injury is significantly reduced by the hepatoprotective activity of *Tridax procumbens* aerial parts. Due to its ability to destroy liver cells, D-GalN/LPS has been suggested to be hepatotoxic (Mundada *et al.*, 2010). The DGaLN-induced multifocal necrosis is similar to the viral hepatitis lesion in humans. This amino sugar is known to selectively block transcription and, as a result of endotoxin toxicity, causes fulminate hepatitis within 8 hours of administration (Kondawar *et al.*, 2019, Ravikumar *et al.*, 2005).

Antidiabetic activity:

The fractions antioxidant activity was measured using the IC₅₀ method. The IC₅₀ value was defined as the concentration of methanolic extract fractions (in g/ml) that indicates a 50% increase in the formation of DPPH radicals (Kumar *et al.*, 2012, Bhagwat *et al.*, 2008). In a model of alloxan-induced diabetes in rats, aqueous and alcoholic extracts of *Tridax* leaves showed a significant reduction in blood glucose levels (Mundada *et al.*, 2010).

Immunomodulatory activity:

In an animal model, ethanol decoctions of the *Tridax procumbens* leaves had an immune-modulatory effect. Immune response stimulation was also observed, as well as an increase in haemo-agglutination antibody levels (Ghosh *et al.*, 2019, Tiwari *et al.*, 2004). When albino rats were given an ethanolic extract of *Tridax procumbens* leaves after being given *Pseudomonas aeruginosa*, the humoral immune response was stimulated, and the hemagglutination antibody titer was increased. *Pseudomonas aeruginosa* proliferation was inhibited, and phagocytic index, leukocyte count, and splenic antibody-secreting cells all increased significantly (Safina *et al.*, 2017, Oladunmoye *et al.*, 2006).

Wound healing:

Tridax procumbens has been shown to have anticancer, antimicrobial, and anti-inflammatory properties and has been used for wound healing in the past. Various *Tridax procumbens* extracts have been studied in vivo and in vitro for wound healing properties. A 2.5 % to 5% ethanol extract showed significant wound contraction in the incision model. The authors concluded that flavonoids and tannins were responsible for the effect (Inbole *et al.*, 2021). A complex interaction between epidermal and dermal cells, the extracellular matrix, controlled angiogenesis, and plasma-derived proteins, all of which are regulated by cytokines and growth factors, mediates

the wound-healing activity of the plant decoction. Waterleaf decoctions, like whole plant decoctions, increased lysyl oxidase, but to a lesser extent (Ghosh *et al.*, 2019, Tiwari *et al.*, 2004).

Hypotensive effect:

Anaesthetized *Sprague Dawley* rats were used to test the cardiovascular effects of an aqueous extract of *Tridax procumbens* leaf. The aqueous extract reduced mean arterial blood pressure in a dose-dependent manner (Salahdeen *et al.*, 2004). The higher dose results in a significant decrease in heart rate, whereas the lower dose has no effect. As a result, *Tridax procumbens* leaves had hypotensive effects (Safina *et al.*, 2017).

CONCLUSION:

According to research, *Tridax procumbens* Linn. is a potent medicinal plant. This is supported by phytochemical, pharmacological, and traditional medicinal systems. This plant is widely distributed, and each of its parts has a high level of pharmacological activity. In the future, this medicinal plant could be a valuable source of herbal drugs for the pharmaceutical industry.

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