A Review of Medicinal Uses and Pharmacological Activities of Tridax Procumbens (L)

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Abstract: Tridax procumbens, or Tridax daisy, is a medicinal plant in the Asteraceae family, traditionally used in Indian and African folk medicine for various conditions, including wounds, fever, and skin diseases. Recent studies support its medicinal claims, revealing biological activities such as anti-inflammatory, antioxidant, and anticancer effects. The plant contains bioactive compounds like flavonoids and alkaloids, contributing to its therapeutic potential. This review highlights its traditional uses, phytochemical makeup, and pharmacological benefits, while calling for more clinical studies to confirm its safety and efficacy in modern medicine.

Keywords: flavonoids, anti-inflammatory, antioxidant, and anticancer

I. INTRODUCTION

Ghamara, as it is known locally, is a member of the Tridax procumbens, T. balbisioides, and Asteraceae or Compositae families. Tridax procumbens is a medicinal plant that is also referred to as Trilobata, Kansari (Hindi), or Coat Button. It is a plant that is mostly utilized in traditional Indian systems. It is a Central American annual or perennial weed that is widespread in India, particularly in the states of Maharashtra, Madhya Pradesh, and Chhattisgarh. With solitary, long-stemmed, yellow composite, heterogamous, bisexual blooms that have white floral heads and extremely hairy, coarsely serrated, petislate, ovate, or lanceolate leaves, it frequently roots at nodes. The entire aerial portion has therapeutic use; the leaves have insecticidal, wound-healing, antisecretory, and hypotensive properties, and the seeds are used to stop bleeding [1]. Additionally, it possesses a number of pharmacological characteristics, such as anti-oxidant, anti-hepatotoxic, analgesic, antidiabetic, anti-inflammatory, antifungal, and antibacterial actions (Tables 1-3). This species has been utilized in Indian Ayurveda from ancient times. This species has been used to make a variety of products, including oils, drinks, and skin poultices. The plant defense mechanism and scientifically tested secondary metabolites such flavonoids, alkaloids, tannins, carotenoids, and saponins are probably what give the species its usefulness [2].

Keywords:
Tridax procumbens is the drug profile.
Tridax procumbens' scientific classification:
Kingdom: The Plantae
The spermatophyta division
Category: Angiospermae
Cotyloideae is a subclass of Dicotyledonae.
Order: Asterales
The Asteraceae family
Typical Name: Button coating
The plant known as Tridax procumbens Linn.

Synonyms:
Coat buttons, Gaddi Chemanthi, Ghajadvu, Mexican daisy, Tridax daisy, and Tridhara. (3)

Geographical source:
Originally from the tropical Americas, Tridax procumbens—also referred to as coat buttons or tridax daisy—has spread throughout tropical, subtropical,

and mild temperate regions of the world, including Africa, Asia, and Australia. Riverbanks, waste grounds, and roadsides are examples of disturbed open environments where it can be found.

Region	Common/Local Name	Distribution
India	*Coat Button, Tridax Daisy*	All over India
Sri Lanka	*Bal Kiriya*	Common weed
Nigeria	*Broom weed*	Roadsides, farmlands
Mexico	*Cadillo Chino*	Native region
Thailand	*Ya pak kaad*	Common weed
Australia	Tridax Daisy	Naturalized weed
Caribbean	Coat Button	Common along roadside

II. MORPHOLOGICAL CHARACTERS

1. Habit
A perennial, creeping, procumbent or ascending herb. Stems are slender, branched, up to 30–50 cm long, often rooting at the nodes.

2. Root
A taproot system, with numerous secondary roots.

3. Stem
Cylindrical, green, hairy (strigose with white hairs).
Often reddish at the base.

4. Leaves
Simple, opposite, and decussate.
Shape: ovate to lanceolate, 4–8 cm long.
Margin: coarsely serrated or dentate.
Surface: densely hairy and rough.
Petiole short, or sometimes nearly sessile.

5. Inflorescence
Solitary capitulum (head) borne on a long peduncle (up to 10–20 cm).
Flower heads are 2–3 cm in diameter.

6. Flower
Heterogamous head:
Ray florets: white or yellowish-white, 3–4 in number, female, ligulate.
Disc florets: numerous, yellow, tubular, bisexual.
Bracts (involucre) are green, hairy, arranged in 2–3 rows.

7. Fruit
A cypsela (achene), blackish-brown, narrow, oblong, 2–3 mm long.
Covered with stiff hairs.

8. Pappus
Feathery white pappus bristles (about 2 mm long) aiding wind dispersal.

9. Seeds
Small, dark brown to black, with silky hairs attached for dispersal.

III. MICROSCOPIC STUDY

Tridax procumbens leaves have a single layer composed of polygonal tabular cells, cylindrical palisade cells, and spongy parenchyma. The roots have tangentially elongated cells with thin walls, while the cortex is composed of oblong to polygonal parenchymatous cells. The stele is covered with a single layer of pericycle, which is made up of alternating phloem and xylem organized in a circle. The stem slice's cortex is made up of 6-7 layers of parenchyma and 1-2 layers of collenchyma. Fibers, collenchyma cells, glandular trichomes, latex cells, and root cortex cells can all be observed under powder microscopy, however the endodermis is not precisely visible. The leaf has unicellular covering trichomes and spiral vessels. Powder microscopy can reveal the endodermis, however it is not precise. (4)

Extraction Procedure of *Tridax procumbens*
1. Collection and Authentication
Gather the entire Tridax procumbens plant or a particular portion, such as the leaves, stems, or flowers. To get rid of grime, give it a thorough wash with distilled water.
Verify that the plant material comes from a reputable botanist or herbarium.

2. Drying
To maintain the active chemicals, shade-dry the plant material at room temperature.
Dry till the weight remains consistent.

3. Powdering
Using a pulverizer or grinder, ground the dry plant material into a coarse powder.

Keep in a tightly sealed container.

4. Defatting
In a Soxhlet device, treat powdered material for 6–8 hours using a non-polar solvent, such as petroleum ether, at 40–60°C.
This eliminates chlorophyll, lipids, and waxes.

5. Extraction
Various solvents are employed based on the phytoconstituents that are needed.

Aqueous Extraction:
Bring distilled water to a boil with powdered particles (hot maceration/decoction).
Reduce the pressure while filtering and concentrating.
The most used method is alcoholic extraction:
Use either methanol or 70% to 95% ethanol as a solvent.
Extract using either maceration (72 hours with periodic stirring) or Soxhlet extraction (6–8 hours).
Use a rotary evaporator set at -40°C with reduced pressure to filter and concentrate.
Extracting Solvents One After the Other:
Using solvents of increasing polarity, extract in the following order: petroleum ether → chloroform → ethyl acetate → methanol → water.
This distinguishes between polar and non-polar phytochemicals.

5. Concentration & Drying
Use a rotary evaporator to concentrate the extract.
To get a solid extract, either freeze-dry (lyophilize) or dry under vacuum.

6. Storage
Until it is used in pharmacological or phytochemical research, keep the dried extract at 4°C in an airtight, amber-colored bottle.

IV. MEDICINAL USES

The wild plant T. procumbens, which is indigenous to India, Nepal, and Nigeria, is used to cure a number of ailments, including inflammation, bronchial catarrh, diarrhea, and dysentery. In Ayurveda, it is also suggested as "Bhringraj" to treat liver conditions and promote hair growth. The leaves of T. procumbens are used to stop bleeding from cuts, bruises, and wounds because they contain parasitic and insecticidal qualities. For many generations, traditional medicine has utilized the plant's fresh leaf juice to treat wounds, skin conditions, typhoid fever, coughing, and blood clotting. In Guatemala, it is used to treat gastrointestinal disorders, diarrhea, tonsils, tonsillitis, and mouth ulcers. Native to India, Nepal, and Nigeria, T. procumbens is a wild plant that is used to treat a variety of conditions, such as bronchial catarrh, inflammation, diarrhea, and dysentery. Additionally, it is recommended as "Bhringraj" in Ayurveda to heal liver disorders and encourage hair development. Because T. procumbens leaves have parasite and insecticidal properties, they are used to stop bleeding from wounds, cuts, and bruises. For thousands of years, conventional medicine has used the plant's fresh leaf juice to cure blood clotting, coughing, wounds, skin disorders, and typhoid fever. It is used to treat tonsils, tonsillitis, mouth ulcers, and gastrointestinal issues in Guatemala. (5)

Traditional Medicinal Uses of *Tridax procumbens*
1. Wound Healing
The leaves of Tridax procumbens have long been applied as a plaster or poultice to wounds, cuts, and ulcers.
aids in halting bleeding and encourages quicker recovery.
extensively utilized in African and Indian traditional medicine and Ayurveda

2. Anti-inflammatory and Pain Relief
To lessen swelling and inflammation from wounds, insect bites, or skin irritations, leaf extracts are applied topically.
In conventional therapy, it is also utilized to relieve joint and muscle pain.

Antimicrobial Uses
used to cure ulcers, boils, and skin diseases.
demonstrates antifungal and antibacterial qualities in conventional applications.

3. Respiratory Disorders
A leaf decoction is used in some areas to treat bronchial infections, colds, and coughs.

4. Digestive Health

The plant has long been used to cure stomach issues, diarrhea, and dysentery.
Leaf juice can be used as a mild laxative on occasion.

5. Hemostatic and Circulatory Uses
applied externally to tiny cuts to stop the bleeding.
In traditional medicine, it is occasionally used in conjunction with other plants to purify the blood.

6. Insecticidal and Anti-parasitic Uses
To keep insects away, crushed leaves are applied to the body.
used historically to get rid of lice and skin parasites.

Other Uses
It has been utilized in traditional medicine to: Lower fever

Protection of the liver
Eye conditions (some cultures use leaf juice as eye drops)

Chemical Constituents: Tridax procumbens contains a variety of chemical components, including alkaloids, flavanoids, cartenoids, fumaric acid, luteolin, quercitin, oxyester, lauric acid, myristic, palmitic, arachidic, linoelic acid, and tannin. It has been identified as a potential source of provitamin A, potassium, and plant protein supplements. The plant also contains minerals such as calcium, magnesium, potassium, sodium, and selenium. The plant produces four other terpenoids in addition to bis-bithiphene: oleonic acid, lupeol, and beta-amyrenone. Tridax procumbens Linn was used to extract two novel flavones: betulinic acid, oleolic acid, esculetin, and puerarin. Four other compounds are also known to be present in the plant: betulinic acid, oleolic acid, puerarin, and esculetin. (6)

V. PHARMACOLOGICAL ACTIVITY

Anti-microbial activity:
The green perennial plant Tridax procumbens Linn, which grows in India, belongs to the Asteraceae family. It produces a variety of chemicals, including flavones, glycosides, arachidic acid, lauric acid, and palmatic acid. Extracts from Tridax procumbens have been shown to exhibit a range of pharmacological effects and antibacterial efficacy against both gram-positive and gram-negative infections. These findings show the plant's potential for medicinal application. (7)

Wound Healing activity:
In order to realign the injured tissue and restore its normal continuity, a series of biological processes occur during the wound-healing process. In order to maintain their health, living creatures react to wounds that heal quickly. (8)

Antifungal activity:
Two fungal strains, Aspergillus niger MTCC 282 and Aspergillus flavus MTCC 277, were cultivated in Sabouraud Dextrose Agar medium. The extracts' antibacterial activity was evaluated using Disc Diffusion Test 11 at a standard medication dose of 1 mg/disc of itraconazole. The Zone of Inhibition (IZ) was used to measure the antifungal activity of three distinct extracts. The Activity Index (AI) of each extract was computed by dividing its IZ by the standard's IZ. (9)

Anti-daibetic activity:
The study found that water and alcoholic leaf decoctions significantly reduced blood glucose levels in an animal model. In diabetic rats, oral treatment of 50% methanol decoctions significantly lowers fasting blood glucose levels. The plant extracts, which are frequently found in herbal remedies, were administered orally to the animals for seven days at a dose of 200 mg/kg body weight. The alcohol and water decoctions significantly lowered blood glucose levels, but the petroleum ether extract only marginally did so. (10)

Anti-inflammatory activity:
The study needed to weigh, number, and mark the hind paws just past the tibio-tarsal junction in order to maintain a constant paw volume. The mercury displacement method was used to measure the initial paw volume of each rat, and the results were compared and examined. Antibacterial activity: To ensure a constant paw volume for the study, animals were weighed, numbered, and had their hind paws marked just past the tibio-tarsal junction. The mercury displacement method was used to assess each rat's initial paw volume, and the results were compared and examined.

Hepatoprotective activity:
This study examined the ability of the aerial portions of Tridax procumbens to protect rats against hepatitis caused by d-galactosamine/lipolysaccharide (dGalN/LPS), a hepatotoxic agent that can destroy liver cells. Human viral hepatitis lesion and d-GalN-induced multifocal necrosis are similar. The amino sugar induces fulminant hepatitis within eight hours of ingestion. (11)

Immunomodulatory:
In albino rats, ethanolic extracts from Tridax leaves have been demonstrated to exhibit immunomodulatory properties that prevent the growth of Pseudomonas aeruginosa. The ethanol insoluble fraction of Tridax extract significantly increased the splenic antibody-secreting cells, phagocytic index, and leukocyte count while also inducing the humoral immune response. (12)

Anti-oxidant Activity:
The study assessed the ascorbic acid and Tridax procumbens fractions' ability to scavenge free radicals using DPPH. The IC50, or the concentration of the fractions exhibiting a 50% reduction in DPPH radical production, is a measure of the antioxidant activity of the methanol extract fractions.

Anti-cancer Activity:
The cytotoxicity of compounds derived from plants against human lung cancer cells was assessed using the MTT test. Lupeol was one substance that shown a 90% decrease in cell viability. Its anticancer properties were assessed by the study using a range of techniques, such as DNA fragmentation, cell © 2024 IJRAR July 2024, Volume 11, Issue 3 www.ijrar.org (E-ISSN 2348-1269, P- ISSN 2349-5138) IJRAR24C1004 International Journal of Research and Analytical Reviews (IJRAR) 26 cycle regulation, clonogenic survival assessment, and COX-2 activity inhibition. At 320 µg/ml, the luteol molecule demonstrated notable anti-tumor effectiveness. (13)

Anti-malarial Activity:
Further research is required, although the water and ethanol infusions show minimal toxicity to human red blood cells and have anti-plasmodial properties against the chloroquine-resistant parasite Plasmodium falciparum. (14)

Anti-lithiatic Activity:
By inhibiting oxidative stress, calcium oxalate urolithiasis, and lipid peroxidation, plant ethanol extract has been shown in animal studies to be beneficial in treating kidney stone diseases. Plant decoction treatment reduced calcium oxalate kidney deposits, calculogenesis-induced urine excretion, and lipid peroxidation, indicating anti-urolithiasis and antioxidative properties. (15)

Anti-obesity Activity:
A study found that while plant decoctions significantly increased high-density lipoprotein cholesterol levels in mice, they significantly decreased total cholesterol, triglycerides, free fatty acids, and total protein. (16)

Analgesic Activity:
Lyophilized plant decoctions were found to have analgesic properties. (17)

Repellency Activity:
The study investigated the potential resistance of essential oils extracted from leaves against the malaria parasite Anopheles stephensi in mosquito cages using the steam distillation method. (18) Three distinct concentrations of each essential oil were examined. The plant's essential oils produced a pronounced repulsive effect. (19)

Hypotensive Activity:
The study looked at how leaf decoctions affected the circulation of sedative-induced animals. The results showed that the decoctions significantly reduced mean arterial blood pressure and that higher doses reduced heart rate without altering it. (20)

VI. CONCLUSION

This study emphasizes the importance of researching plants used in traditional medicine in order to develop new medications. Tridax procumbens is a plant with a long history of traditional use that has been used to treat a number of illnesses and distinct metabolites. Because the pharmacological properties of each phytochemical were not adequately considered during separation and evaluation, problems with repeatability have emerged. Various extraction techniques have been used to treat various illnesses, although many

Research has either contradicted or failed to support each other. According to research, Tridax is a better anti-diabetic medication than traditional treatments. Future studies must focus on the relationships between certain phytochemicals and how they affect various disease types. More research is needed in areas including physiological activity, concentration, and extraction yield. The creation of innovative medications or preventative healthcare will benefit from these discoveries.

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