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Review Article

Pharmacological Activity Of Tridax Procumbens

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ABSTRACT

Tridax procumbens, or coat buttons, is an significant medicinal plant, primarily found in southern and central America.. It is a member of the Asteraceae family. All around the world, it grows well in tropical, subtropical, and mildly temperate climates.This flowering plant, recognized as a widespread weed, boasts numerous medicinal properties. The entire plant extract serves as a valuable drug, with Tridax procumbens being utilized for its antidiabetic, antioxidant, hepato-protective, and wound-healing attributes. Additionally, it aids in the management of kidney stone disease, liver problems, and infectious skin infections. Flavonoids, alkaloids, saponins, tannins, terpenes, kaempferol, and isoquercetin are some of the plant's main active ingredients. It has historically been used to treat conditions like gastritis, blisters, ulcers, jaundice, and respiratory disorders.

INTRODUCTION

Native to central and southern America, Coat buttons, or Tridax procumbens, are a member of the Asteraceae family[1]. It is found around the world in somewhat temperate, tropical, and subtropical climates. This herbaceous creeper weed is a tiny, semi-prostate plant that can be either an annual or perennial. It is distinguished by short, hairy leaves that resemble blades. The bright yellow corolla is paired with an elongated, branching, sparsely hairy stem that roots at nodes and reaches a height of 20 to 60 cm. The opposite, simple leaves are oblong or oval, about 4–8 cm in length, with a cuneal base, a short leafstalk, and a toothed margin. They are hairy on both surfaces. The yellow, hairy flowers are located in a tubular capitulum inflorescence. There are two ray florates and disc florets[2] India has a long history of using Tridax procumbens for scratch healing, as well as blood thinner, antimycotic, and mosquito repellant purposes. Wounds are often treated by directly applying the juice that is collected from the leaves. Leaf extracts from the plant have been utilized to treat viral skin diseases in conventional medicine. Tridax procumbens is used in Indian medication used for liver ailments, offer liver defense, and

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treat ailments including stomach aches and heartburn [3-4]. Furthermore, Tridax procumbens is used by indigenous healers in several regions of India to cure cuts, boils, and blisters [5].

MATERIALS AND METHODS[6] :

Collecting and Examining Plant Material

The research was carried out in Navi Mumbai, India, at the M.G.M. New Bombay Hospital and M.G.M. Medical College, with consent from the Institutional Ethics Committee. During the monsoon season (July and August), the leaves of Tridax procumbens were collected from the M.G.M. Medical College campus. Additionally, a herbarium specimen bearing voucher number WP-076 was sent to the Botany Department at the Agarkar Institute in Pune, India. The identification of Tridax procumbens within the Asteraceae family was confirmed by the taxonomic categorization.

Extract Preparation :

The plant material underwent a meticulous washing with tap water and was then subjected to shade drying for a period of 7 days. The leaves were subsequently crushed in an electronic blender to obtain a coarse powder. The extraction process involved utilizing 100 grams of this coarse leaf powder from Tridax procumbens in a Soxhlet extractor with 500 milliliters of 80% ethanol kept for 48 hours. Likewise, 500 milliliters of sterile water and the powder alone were used to create an aqueous extract. The excerpts,, essential for preliminary phytochemical analysis and subsequent antimicrobial activity testing, were stored in desiccators.

Evaluation of Antimicrobial Properties :

Standard strains from the American Type Culture Collection (ATCC) of Pseudomonas aeruginosa, Escherichia coli, and Staphylococcus aureus were among the bacterial strains tested. Furthermore, Salmonella typhi, Escherichia coli, Klebsiella pneumoniae, Shigella flexneri, and Pseudomonas aeruginosa are examples of gram-negative non-fermenting bacilli. Gram-positive species include Staphylococcus aureus and Enterococcus faecalis. were among the bacterial isolates that were obtained from a variety of clinical samples, covering both community-acquired and nosocomial infections. Using agar well diffusion techniques, ethanolic and aqueous extracts were applied for the antimicrobial testing, adhering to the Perez et al. (1990) approach. There were three different extract concentrations used: 1 g%, 2.5 g%, and 5 g%. Hinton Mueller agar plates were inoculated using a standard inoculum (1×106 CFU/ml) of the relevant bacterium in the agar well diffusion method. The extract was pipetted directly into 100 microliters of wells that measured 10 mm in diameter in the plates. This yielded final concentrations of 1 mg, 2.5 mg, and 5 mg, respectively. After an overnight incubation period at 37°C, the diameter of the zones of inhibition encircling the wells was used to measure the antibacterial activity of the plates. The mean zones of inhibition were computed after the tests were run in triplicate. Using either sterile water For every bacterial strain, controls were added in place of the T. procumbens extract, either in the form of pure ethyl alcohol (for the ethanolic extract) or aqueous extract. To determine the effective zone size of the ethanolic extract, the zone size of the alcohol control was subtracted from the total zone of inhibition size. In addition, Pseudomonas aeruginosa strains were tested against five widely used antibiotics (Ciprofloxacin, Augmentin, Cefotaxime, Ticarcillin, and Imipenem) in the study, and the zone sizes against each antibiotic were compared to those against the Tridax extract. The data were statistically evaluated using the paired "t" test for students to establish meaningfulness at $p < 0.05$. The mean of three readings was obtained.

Classification within the taxonomic system[7]:

Kingdom: Plantae

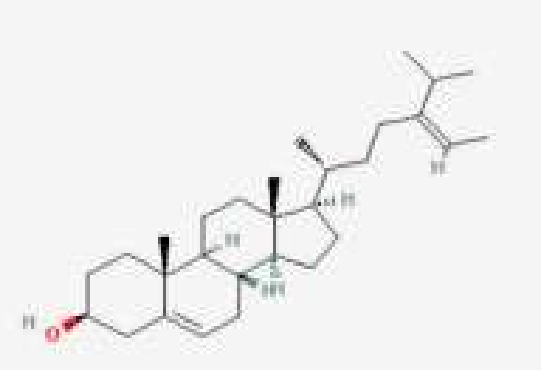
Subkingdom: Tracheobionta

Division: Spermatophyta
Subdivision: Magnoliophyta
Class: Magnoliopsida
Subclass: Asteridae
Order: Asterales
Family: Asteraceae
Genus: Tridax
Species: procumbens

Tridax Procumbens plant

Tridax Procumbens flowers

Flavone glycosides, chromglycosides, sterols and polysaccharides whose primary chain is beta-1,6-D-galactan are all present in T. procumbens. GCMS analysis of the petroleum ether fraction's unsaponifiable fraction has shown the presence of beta-sitosterol, stigmasterol, and campesterol [8]. Four terpenoids—taraxasteryl acetate, beta-amyranonelupeol, oleanolic acid, and tri-bisbithiophene—and a new bithiophene have been identified from the hexane extract's ethyl acetate-soluble portion [9]. Procumbenetin, a recently identified flavonoid, has been identified as 3,6-dimethoxy-5,7,2',3',4'-pentahydroxy flavones and 7-O-beta-3-glucopyranoside. It was isolated from the aerial section of T. procumbens.[9] Procumbenetin, a recently identified flavonoid, was identified as 3,6-dimethoxy-5,7,2',3',4'-pentahydroxy flavones, or 7-O-beta-3-glucopyranoside. It was isolated from the aerial section of T. procumbens [9]. Methyl 14-oxooctadecanoate, methyl 14-oxononacosanoate, 3-methylnonadecylbenzene, heptacosanyl cyclohexanecaprylate, and 1(2,2dimethyl-3-hydroxypropyl) are eight new compounds from Tridax procumbens.Spectral data and chemical research have been used to characterize -2-isobutylphthalate, Twelve-hydroxytetracosan-15-one, thirty-methyl-28-oxodotriacont-29-en-1-oic acid, and thirty-methyl-3-oxotetratriacont-31-en-1-ol[10]. Dotriacontanol -Amyrone Dehydrolupen-3-one (12) -lupeol, fucosterol, amyrin, Sitosterol, 10-oxononadecane, and 9-oxoheptadecane are among the nine known chemicals that were initially discovered to be present in the plant [11].



Botanical structure and form

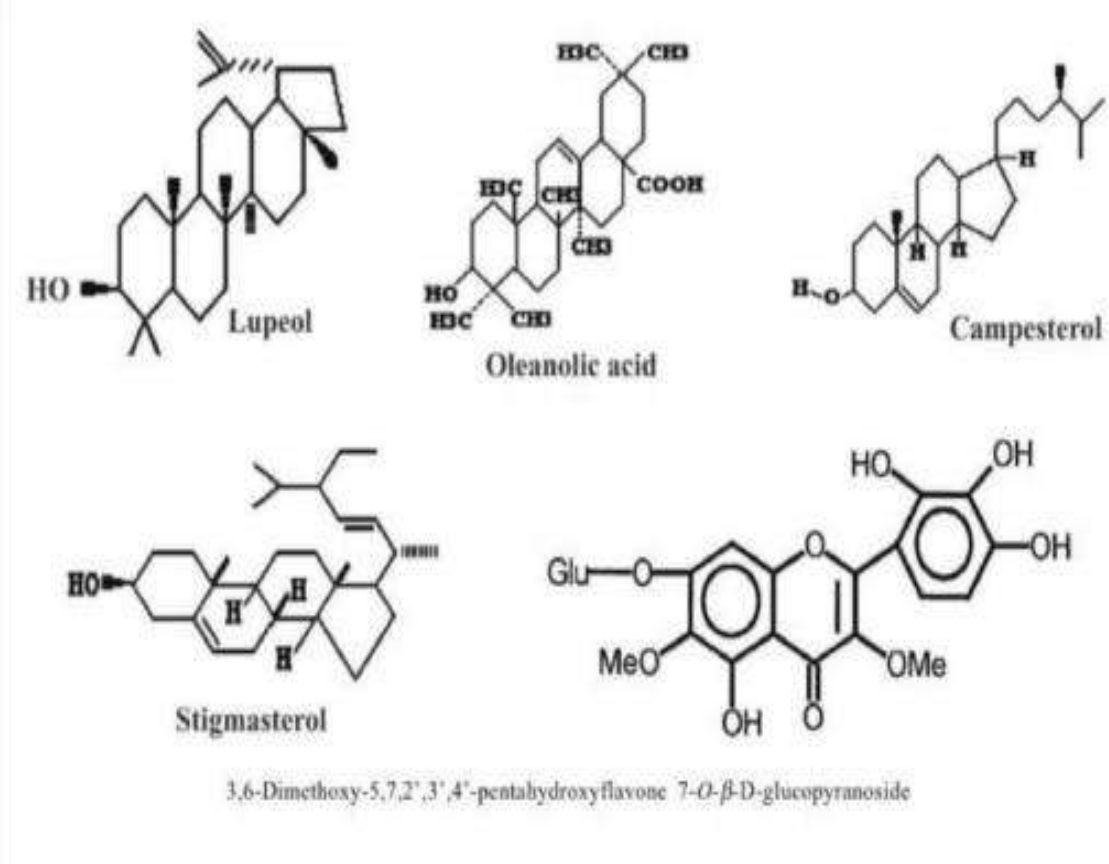


Fig.1.1Whole Plant

Leaves

The leaves measure 1 to 2 cm in length, arranged oppositely, and are characterized by simplicity and the presence of a petiole. These leaves are soft, thick, and display a dark green hue. The lamina takes an oval to lanceolate shape, measuring 2–6 cm in length and 2–4 cm in width., with a clearly defined and unevenly serrated edge and an attenuate base in the corner. The leaves have pubescence more numerous on the underside and hispid, tuberculate-based hairs covering both side

Fig.1.2 Leaves

Inflorescence

The inflorescences appear as solitary capitula, supported by a peduncle measuring 12 to 32 cm in length and featuring abundant hispid characteristics.The involucre's bracts are arranged in two rows and have an oval to lanceolate form., measuring 6 mm in length, and displaying a pubescent and green appearance

Fig .1.3 Inflorescence

Flower

The capitulum comprises Three to eight ligulate, daisy-like female blooms with a tridentate arrangement in the center and creamy white tints around the periphery. The bisexual flowers have a yellow, tubular shape. There are five short tines at the head of the 6 mm-long tube. This plant displays basal placentation through its two bloom kinds, ray florets and disc florets.

Fig 1.4 flower

Phytochemical Composition :

Tridax procumbens is enriched with various phytochemical constituents:

Leaves:

Alkaloids (akuammibe, vaucangine), terpenes (α and β pinenes), condensed catechic, flavonoids, kaempferol, (-)-epicatechin, isoquercetin, and glucoluteolin are found in leaves. Buds and pedicles contain alkaloids as well.

Dried Leaves:

Saponins and flavonoids.

Flowers:

Flavonoids, kaempferol, isoquercetin, (-)-epicatechin, saponin B-sitostrol-3-o-β-d-xylopyranoside, and glucoluteolin.

Stem and Root

Glucoluteolin, flavonoids, isoquercetin, kaempferol, and (-)-epicatechin [13–26].

TRADITIONAL UTILIZATION

Tridax procumbens, recognized as both a common weed and a flowering plant, it has a variety of therapeutic uses.. In the traditional practices of India, it has been employed as an anticoagulant, antimicrobial agent, insect repellent, and a healing agent for wounds. Additionally, it finds application in treating boils, blisters, ulcers, and serves as a folk remedy for hair tonic. The plant's leaf decoctions have been historically utilized to address infectious skin diseases in ethnomedicine. Its reputation extends to Ayurvedic medicine, particularly for liver disorders, given its hepatoprotective properties. Furthermore, the extracts are harnessed for managing gastritis and heartburn [27]. Widely employed in wound healing, Tridax procumbens is known to arrest hemorrhage from cuts, bruises, and wounds. Its application extends to reducing high blood pressure, regulating blood glucose levels, and addressing issues such as dysentery and severe diarrhea [28,29,30]. Notably, the plant is considered beneficial in preventing hair loss and stimulating hair growth. Its strong immuno-modulating and insect-repelling properties are widely used in respiratory treatments [31]. The plant's leaves are used to treat conjunctivitis. cure

by tribal populations and rural medical practitioners in West Africa and more tropical regions worldwide [32]. In ethnic cultures, this medicinal herb has historically been used to treat liver diseases and jaundice [33]. Kidney stone disorders have also been treated with Tridax procumbens ethanol decoctions [34].

Fig 2 . Tridax Procumbens has a number of possible medicinal uses. [35]

PHARMACOLOGICAL ACTIVITY :

1. Antioxidant Activity

The scavenging activity of free radicals in Measured were the hydrogen-donating or radical scavenging capacities of Tridax procumbens fractions and Ascorbic acid using the stable free radical 2,2-diphenyl-1-picrylhydrazyl (DPPH).[36]. The amount of methanol extract fractions (in milligrams per milliliter) that demonstrates a 50% reduction in the generation of DPPH radicals is known as the IC50, which is used to express the antioxidant activity of the fractions [37].

2. Antibacterial Activity

Previous research has reported the the Tridax procumbens plant's antibacterial effectiveness against a variety of bacterial species in its various sections. The complete plant is physically pressed to extract juice, which is then applied twice daily for four to five days to heal cuts and wounds. The disk diffusion assay showed that the extract from the entire plant had antibacterial characteristics, particularly against Pseudomonas aeruginosa. Both gram-negative and gram-positive bacteria, including Staphylococcus aureus and Bacillus subtilis Pseudomonas aeruginosa and Escherichia coli, were among the four bacterial strains that were examined [38]. The ethanol extract was found to exhibit noteworthy efficacy in treating multidrug-resistant nosocomial strains of Pseudomonas. This suggests that the extract has prospective utilize as a source for formulation and an anti-pseudomonal agent for Pseudomonas aeruginosa-related nosocomial illnesses [39].

3. Wound Healing Interventions

Tridax procumbens decoction's ability to cure wounds is attributed to a complex interplay involving plasma-derived proteins, extracellular matrix, regulated angiogenesis, and epidermal and dermal cells[40]. Effectively raising lysyl oxidase was seen with waterleaf decoctions, however not as much as with whole plant decoctions. By increasing the levels of lysyl oxidase, protein, and nucleic acid in the granulation tissue, extracts from the leaves of this plant have been shown to accelerate wound healing in both immune-compromised and healthy rats [41].

4. **Antidiabetic Activity**

Significant anti-diabetic effects were shown by Tridax procumbens in a rat model of alloxan-induced diabetes. Blood glucose levels were significantly reduced by leaf aqueous and alcoholic extracts [42].

5**. Antimicrobial Activity**

Tridax as a whole showed antibacterial efficacy against a range of bacterial species. Fresh plant juice applied twice daily for three to four days was found to be beneficial in treating cuts and wounds, with the disk diffusion approach demonstrating antibacterial action against Pseudomonas aeruginosa in particular [43].

6. **Metaboodulatory Activities**

Pseudomonas aeruginosa-dosed albino rats showed immunomodulatory effects from ethanolic extracts of Tridax leaves. [44]In addition to significantly increasing the humoral immune response, splenic antibody-secreting cells, leukocyte count, and phagocytic index, the extracts prevented Pseudomonas aeruginosa from proliferating [45].

7. **Activities Hepatoprotectives**

Significant hepatoprotective action was shown by Tridax aerial parts in reducing hepatic injury caused by D-galactosamine/lipolysaccharide (D-GalN/LPS) [46].

8. **Anticancer Interventions**

Prostate epithelial cancer cells (PC 3) were treated with crude aqueous and acetone extracts of Tridax procumbens flowers, and these extracts showed anti-cancer action. The MTT assay was used to test the extracts, and the results showed that they may be able to reduce cancer cell viability [47].

9. **Antiobesity Research**

Tridax procumbens treatment significantly reduced total protein, free fatty acids, triglycerides, and cholesterol in a rat model of obesity produced by an atherogenic diet, while increasing high-density lipoprotein cholesterol [48]. These findings imply that Tridax procumbens have anti-obesity qualities.

10. **Antidiarrheal Activity**

In an atherogenic diet-induced obesity paradigm, Tridax procumbens showed strong antidiarrheal effect, indicating its potential to lower increased levels of free fatty acids, total protein, triglycerides, and high-density lipoprotein cholesterol[49].

11. **Malarial Vector Depressivation**

Essential oils extracted from Tridax procumbens leaves exhibited topical repellent properties in mosquito cages against Anopheles stephensi, the malaria vector. The essential oils of Tridax procumbens displayed relatively high repellency effects, making them a potential candidate for malarial vector control [50].

MARKETED PRODUCT [51]

CONCLUSION

The comprehensive review highlights Tridax procumbens Linn. as a valuable medicinal plant supported by phytochemical, pharmacological, and traditional medicinal evidence. By means of histopathological and phytochemical investigations, every segment of the plant discloses unique locations and origins of phytochemicals. The Tridax procumbens exhibits a rich composition, including flavone glycosides, glycosides, bithiophene, flavonoids (Procumbenetin), lipids, polysaccharides, terpenoids, sterols, and each of these substances contributes significantly to pharmacological actions. Insecticidal, leishmanicidal, antitubercular, anticancer, cardiovascular, antidiabetic, hepatoprotective, anti-inflammatory, antioxidant, and wound healing, and antidiarrheal properties are all included in these activities. This diversity lays the foundation for isolating and developing new phytochemicals, offering potential solutions for both acute and chronic global health challenges. Notably, the lower toxicity of phytomolecules compared to synthetic counterparts opens up new research avenues for the development of active phytochemicals. Tridax procumbens emerges as a promising natural resource, demonstrating its significance in the pursuit of effective and sustainable solutions in the realm of global health.

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