

# Review on Tridax Procumbens

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## Abstract

Tridax procumbens Linn., a weed native to tropical America and naturalized in various regions including India, Africa, Asia, and Australia, possesses numerous pharmacological activities. Its various parts, including leaves, stems, and roots, have shown beneficial effects such as hepatoprotective (liver-protecting), immunomodulating (modulating the immune system), wound healing, antidiabetic, hypotensive (lowering blood pressure), antimicrobial, insect repellent, anti-inflammatory, antioxidant, and hair growth promotion properties. The plant has also been used as a bioadsorbent for removing chromium (VI) from industrial wastewater. The plant is referred to as “Bhringraj” in Ayurveda and has been incorporated into traditional medicines. However, scientific research linking the plant’s phytochemical constituents with their pharmacological properties is limited. Many studies have focused on using plant extracts and qualitatively analyzing their phytochemical composition. To advance the understanding and potential therapeutic applications of Tridax procumbens, researchers are encouraged to employ modern drug discovery approaches, such as bio-assay guided phytochemical identification, phenotypic screening using relevant cell culture models, and establishing pharmacokinetic-pharmacodynamic correlations. Efforts should be made to identify active metabolites responsible for the plant’s efficacy in vivo, allowing for the standardized preparation of extracts. Additionally, researchers can explore various enzyme targets for different diseases and test partially purified bioactives as inhibitors or activators. Molecular modeling, medicinal chemistry, and bioinformatics approaches can aid in identifying new bioactives that could serve as drug leads. By leveraging modern technologies, researchers can further evaluate the pharmacological properties of Tridax procumbens. Overall, Tridax procumbens possesses significant potential in terms of botanical, phytochemical, nutritional, and pharmacological properties. Extensive utilization of this plant in ancient systems of medicine for various biological disorders, including notable pharmacodynamic correlations activities, indicates the need for further research to elucidate its mechanism of action. As a source of herbal drugs, Tridax procumbens holds promise for the pharmaceutical industry, and its diverse phytochemical profile offers potential for the development of novel therapeutic agents.

**Keywords:** Immunomodulating, Pharmacodynamic Correlations, Pharmacodynamic Correlations

## Introduction:

Tridax procumbens. Commonly known as coal buttons Mexican daisy is a flowering plant that belongs to the asteraceae family It is a small, herbaceous annual or perennial plant that is native to the tropical

regions of the Americas, including Mexico, Central America, and parts of South America. The plant is characterized by its low growing, mat-forming habit, with branches that spread horizontally. The leaves of *Tridax procumbens* are opposite, toothed and covered with fine hairs. The plant produces bright yellow, daisy-like flowers with three prominent teeth on the outer ray florets. The central disc florets are tubular and also yellow in colour. *Tridax procumbens* is adaptable to various soil types and can thrive in both dry & moist conditions. It is often found in disturbed areas, such as fields, roadsides, and waste places. In some regions, it is considered a weed due to its ability to quickly colonize open spaces and outcompete native plants. The plant has been used in traditional medicine for various purposes. In some cultures, the leaves & flowers are believed to have medicinal properties and are used to treat ailments such as fever, digestive disorders, and skin conditions.

**Figure-1 Plant of *Tridax Procumbens* Linn.**



**Table-1 Classification of *Tridax Procumbens* Linn.**

	Classification	Scientific Name	Biological Name
1	Kingdom	Plantae	Plant
2	Sub kingdom	Tracheobionta	Vascular plants
3	Division	Spermatophyta	-
4	Subdivision	Magnoliophyta	Flowering plants
5	Class	Magnoliopsida	Dicotyledons
6	Subclass	Asteridae	-
7	Order	Asterales	-
8	Family	Asteraceae	Aster family
9	Genus	<i>Tridax</i> L.	<i>Tridax</i>
10	Species	<i>Tridax procumbens</i> L.	Coat buttons

**Table 2- Vernacular names of *Tridax Procumbens* Linn.**

Country/Language	Vernacular Name
English	Coat button
Latin	<i>Tridax procumbens</i>
Marathi	Dagadi pala

French	Herbe caille
Oriya	Bisyhala karani
Sanskrit	Jayanti Veda
Spanish	Cadillo ,Chisaka
Australia	Tridax daisy
India	Bisalyakarmi, Mukkuthipoo,Phanafuli, Tunki, Ghamara,Javanti Veda,Dhaman grass, Vettukkayapoonda, Vettu, kaaya
Hawaii	Tridax
Indonesia	Gletang, Gletangan, Sidowlo, Tar Sentaran
Brazil	Erva de Touro
Honduras	Hierba del Toro
Japan	Kotobukigiku
Thailand	Teen Tuk Kae
United States	Tridax daisy
Trinidad	Railway Weed
Malaysia	Coat Buttons, Kanching Baju
Colombia	Cadillo Chisaca
Mauritius	Herbe Caille
Taiwan	Kotobuki-giku

**Plant Morphology:**

- Habit:** tridex procumbens is described as a prostrate plant indicating that it has a trailing or creeping agrowth habit. it tends to grow close to the ground and spreads horizontally rather than growing upright.
- Stem:** stem are cylindrical,hispid, covered with multicellular hairs of millimetre tuberculation is strong transport system. the plant steam is ascending 30- 50 centimeter height branched, sparsely hairy, rooting at nodes. the stems of tridex procumbens are likely to be relatively thin and flexible. they may have a creeping or trailing nature allow the plant to form a mat-like appreance as it spreads along the ground.
- Roots:** As a prostrate plant, Tridex procumbens likely has a shallow root system, primarily focused near the soil surface.These roots would help anchor the plant and absorb water and nutrients from the surrounding soil.
- Flowers:** The plant Flowers are looking like daisy. The Flower having tubular shape, indicating that the petals are fused together to form a tube like structure.The centre of the flower is yellow. The petals of the flowers can be either white or yellow.the outermost petals known as florets, have three teeth or lobes . The Flowers are arranged in a compact cluster known as a capitulum or Flower head. The plant has two types of Flowers ray florets, and disc florets. are the small tubular Flowers in the centre. The plant Flowers & produces Fruit throughout the year, indicating a perennial nature or continuous flowering behaviour.

5. **Leaves:** The leaf margins have irregular or uneven teeth. The leaves are generally arrow head or triangular in shape. The leaves are simple meaning they are not divided into leaflets. The leaves have an ovate (egg-shaped) or lanceolate (lance-shaped) appearance. They are arranged opposite each other on the stem. The leaves are exstipulate, which means they do not have stipules (small, leaf-like appendages at the base of the petiole). The size of the leaves measure approximately 3-7cm in length.

### Phytoconstituents:

The various research studies, it was showed that the plant has different phytochemical screening, it was observed that alkaloids, carotenoids, saponins, flavonoids and tannis are present in this medicinal plants.

1. **Alkaloids:** Alkaloids are a diverse group of organic compounds that often have pharmacological effect. many alkaloids have been found to passes medicinal properties, such as analgesic, antimicrobial or antidiarrheal activities. Alkaloids are defined as any class of nitrogenous organic compounds of plant origin that have pronounced physiological effect on human.

*Tridax procumbens* in the presence of some alkaloids has also been reported. phytochemical screening analysis using aqueous extraction of an leaves. thirty nine alkaloids were present, mainly: Akuamidine (73.91%) and Voacangine (22.33%) (Ikewuchi, 2012). Besides Alkaloids, the extract contained sterols and tannins. Alkaloids of the pedicle and buds of *T. procumbens* showed Antimicrobial activity against *Proteus mirabilis* and *Candida albicans*; alkaloids from buds showed activity Against *E. coli* and *Trichophyton mentagrophytes*. The total amount of alkaloids in the pedicle was 32.25mg/gdw In the pedicles and 92.66mg/gdw in the buds . The presence of these alkaloids point Once more to the great potential of this plant.

2. **Carotenoids:** Carotenoids are fat-soluble pigments found in the leaves that have three main functions in A plant: light-harvesting, protection from photooxidative damage, and pigmentation to attract insects. Carotenoids have been postulated to prevent damage to DNA by oxidative stress. Many Types of these secondary metabolites have been isolated from *T. procumbens* including beta-carotene, which can Be converted to vitamin A ,which is important for maintenance of epithelial tissues. Vitamin A deficiency can result in impairment of immunity and hematopoiesis, night blindness, and Xerophthalmia. Carotenoids such as beta-carotene and lutein have shown activity in the Reduction of UV-induced erythema. The photo protective properties have also been linked With the antioxidant properties of carotenoids.

2. **Saponins:** Saponins are steroidal glycosides that contain pharmacological and medicinal properties and have been detected in *T. procumbens* ,specifically a steroidal saponin and pB-Sitosterol-3-O-β-D-xylopyranoside in the flowers of the species . Another study determined thasaponins from an ethanolic extract of *T. procumbens* could potentially contain antidiabetic properties by inhibiting the sodium glucose co-transporter-1 in the intestines of male Wistar albino rats.

3. **Flavonoids:** A recent study has demonstrated the presence of twenty-three flavonoids in *T. procumbens* with total content around 65 g/kg. Kaempferol and catechin and its derivatives (-)-epicatechin, (+)-catechin, (-)-epigallocatechin, (+)-gallocatechin, (-)-Epigallocatechin-3-Gallate (EGCG) and (-)-Epicatechin-3-Gallate) account for about 17.59% and 26.3% respectively. The remaining 56.11% represent sixteen flavonoids namely biochanin, apigenin, naringenin, daidzein, quercetin, butein, robinetinbaicalein, nobiletin, genistin, ellagic acid, l, myricetin, baicalin, isorhamnetin and silymarin [

4. **Tannis:** Tannins are naturally occurring water-soluble polyphenols found in plants. Tannins have anti-microbial properties, As well as anti-carcinogenic and antimutagenic properties, potentially because of their antioxidant capabilities. Several researchers have described the presence of tannins in *T. procumbens*. Acetone-water Chloroform-water Showed the .  
presence oftannins in leaf extracts of *T.procumbens*. Tannins are present in the pedicle and buds of *T. Procumbens*

### Medicinal Uses and traditional Uses

The aqueous leaf extract of *Tridax procumbens* possesses cardiovascular effects by significantly reducing heart rate and blood pressure. The lyophilized aqueous leaf extract exhibits anti-inflammatory action comparable to commonly used anti-inflammatory drugs such as ibuprofen and aspirin. The whole aerial parts of *Tridax procumbens* have hepatoprotective properties, meaning they can protect the liver from damage. Additionally, they exhibit antisecretory activity, which can help in reducing diarrhea. *Tridax procumbens* shows activity against bacteria, protozoa, and fungi, making it potentially useful in combating various infections. The leaf juice of *Tridax procumbens* is traditionally used for wound healing, particularly in dead space wounds. The seeds of *Tridax procumbens* are utilized to check all types of bleeding. The aqueous extract of the whole aerial parts of *Tridax procumbens* is used as an immunomodulator, meaning it helps modulate the immune system. *Tridax procumbens* has a long history of traditional use in different cultures. It has been used for treating anemia, colds, inflammation, hepatopathies, bacterial and fungal infections, vaginitis, stomach pain, diarrhea, mucosal inflammations, and skin infections. In Guatemala, it is used to treat protozoal infections, high blood pressure, diabetes, and various gastrointestinal and respiratory infections. Some of the traditional uses of *Tridax procumbens* are supported by scientific studies, such as its anti-plasmodial activity against Chloroquine-resistant malaria parasites (*Plasmodium falciparum*) and its wound-healing and antibacterial properties.

### Traditional Uses:

In Nigeria, the entire plant is used to treat typhoid fever, cough, fever, stomachache, backache, diarrhea and epilepsy. Farmers in Africa use the plant for treatment of livestock for example, *Tridax* is used along *Vigna parkeri* to treat chronic mastitis by grinding both plants, and adding salt and water and applying to the udder. A study studied the antibacterial effect of *Tridax* against mastitis-causing bacteria and found that the ethanolic extract had significant activity against *Staphylococcus aureus*. However, there was little or no activity from the aqueous extracts against *Streptococcus uberis* and *Klebsiella pneumoniae*, in comparison with *Spathodea campanulata* extracts. In Benin, breeders complement the feed of rabbits or other livestock combining with other plants; although rabbits consume it in lower amounts than other fodder, probably due to low palatability. In Togo, the fresh, crushed leaves are used for dressing wounds. The decoction of the leaves is used against pain, to treat malaria, and against abdominal and gastrointestinal mycosis. In India it is known as an insect repellent, used to treat diarrhea, and to help check for hemorrhages. In addition, some reports include the use as a cure for hair loss. A study in Tamilnadu, India, revealed that native inhabitants apply the juice from the leaves for the healing of wounds. The same study also infers that *T. Procumbens* is one of the most useful traditional medicinal plants. It has also been shown to have many minerals like calcium, selenium, magnesium, potassium and sodium. The people in Udaipur, India, have traditionally ingested powdered *T. procumbens* leaves, along with other herbs, to treat diabetes. The species has shown to be a great source of potassium, which is



used for the treatment of cramps and a safe source ingredient for future medicinal uses. These traditional uses demonstrate the potential uses of this plant .

*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.

**Table-3 Traditional Uses and plant preparation:**

Location	Preparation/extract	Plant ailment Uses
Guatemala	Leaves: Juice Leaves: poultice, dried infusions Stems: dried Whole plant: dried	Anemia, colds, inflammation, hepatopathies, vaginitis, stomach pain, diarrhea, mucosal inflammation, skin infections, bleeding. Reduce inflammation, gastrointestinal and Respiratory infections, high blood pressure, diabetes. Protozoal infections, treatment of chronic ulcers Caused by leishmaniasis, gastrointestinal disorders.
India	Leaves: dried and other herbs ingested orally, juice	Diabetes, insect repellent, used to treat diarrhea, and to help check for hemorrhages, as well as hair loss. Jaundice, healing of wounds, inflammation
Africa	Whole plant: blending with other herbs adding salt and water.	Treating mastitis in livestock

**Pharmacological Activities:**

*Tridax procumbens* having various potential therapeutic activities like antimicrobial activity, anti-oxidant, antibiotic efficacies, wound healing activity, insecticidal, anti-inflammatory activity, diarrhea and dysentery. Leaf juice is used to cure fresh wounds, to stop bleeding, as a hair tonic. In India, *Tridax procumbens* mainly used for wound healing, as anticoagulant, antifungal and insect repellent. In folk medicines leaf extract were known to treat infectious skin diseases. *Tridax procumbens* is used as bioabsorbent for removal of harmful Cr (VI) from the industrial waste water as repellent. In folk medicines leaf extract were known to treat infectious skin diseases. It is a well-known medicine for liver disorders or hepatoprotective nature besides gastritis and heart burn. *Tridax procumbens* is used as bioabsorbent for removal of harmful Cr (VI) from the industrial waste water

**1. Antibacterial activity :** The *Tridax procumbens* having antibacterial activity which was tested against the *Pseudomonas aeruginosa*. *Pseudomonas* is the nosocomial strain which was isolated from ventilator associated with pneumonia patient secretions like tracheal secretions and broncho alveolar lavage. This study reported that the ethanolic extract showed very good anti-bacterial activity against *Pseudomonas aeruginosa*. Increased zone of inhibition is at the concentration of 5 mg/ml. The strain

was compared to some control antibiotics like augmentin, ciprofloxacin, cephotaxime and even ticarcillin showed resistant whereas the sensitivity only to imipenem. This report was a statistically significant because the ethanol extract of tridax having inhibition zone against the leading gram negative bacteria associated with nosocomial infections. Whole plant of Tridax is having antibacterial activity. In this whole plant extract with two Gram positive (*Bacillus subtilis*, *Staphylococcus*) and two Gram negative (*Escherichia coli* and *Pseudomonas aeruginosa*) bacteria. This report showed that the effective antibacterial activity of Tridax whole plant only against with *Pseudomonas aeruginosa* by the method of Disc diffusion. The leaf extract of Tridax procumbens used for the analyzing of antibacterial activity by using various solvents like hexane, chloroform, butanol, ethanol and water.

3. Antibiotic test carried out with *Escherichia coli*, *Pseudomonas aeruginosa*, *Micrococcus* sp., *Staphylococcus aureus*, *Proteus vulgaris*, *Klebsiella pneumoniae*, *Bacillus subtilis*, *Citrobacter* sp. and *Serratia marcescens* by disc diffusion method. Gram negative bacteria showed the more zone of inhibition reported in this study. Antibacterial activity was carried out with different solvent extracts Tridax procumbens leaf against *Staphylococcus aureus*, *Escherichia coli*, *Proteus mirabilis* and *Vibrio cholerae*. In this study 5 different solvents like hexane, petroleum ether, chloroform and methanol were used. Antibacterial activity tested against both gram positive (*Staphylococcus aureus* and *Bacillus subtilis*) and gram negative (*Enterobacter aerogenes*) by using Agar well diffusion method. Results indicated that more bioactive compound present in methanol than in hexane extract. Three different enteropathogens are tested against methanol extract of Tridax procumbens by disc diffusion method. The methanol extract showed highest activity against *Salmonella typhi*, *Shigella flexneri* and least activity against *Escherichia coli*.
2. **Antifungal activity** : Antifungal activity of Tridax procumbens with whole plant extract used against the phytopathogenic fungi, *Aspergillus niger* and the leaf extract was tested against *Fusarium oxysporum* and the results showed that good antifungal activity. Essential oil extracted from Tridax procumbens have reported to work antifungal activity against 3 different fungi *Candida albicans*, *Candida tropicalis* and *Candida parapsilosis* about 12–15 mm zone of inhibition. The bioactive compound of flavonoids from Tridax procumbens tested for potential antifungal activity against *niger*, *Aspergillus flavus*, *Candida albicans* and *Trichophyton* sp. and the report showed higher sensitivity of *Candida albicans* indicating the antifungal potential of flavonoids from the plant. Methanol extract of Tridax procumbens prepared from different parts of plant like leaf, stem, flower and root showed significant inhibitory activity against *Candida albicans* (MTCC 227 and MTCC 3017). The inhibition zone ranging is from 8 mm to 13 mm at 100 mg/ml concentration. The methanol extract of root exhibited antifungal activity against *Candida tropicalis* and *Candida glabrata*. While the methanol leaf extract of Tridax procumbens exhibited the susceptibility of *Candida albicans* and *Candida tropicalis*. This evidence supports for the presence of bioactive compounds in the root extract of methanol possess the better and effective anti-candidial drug in future. By using natural fungicidal agents, we reduce the usage of commercial chemical fungicides and its hazardous side effects. In future the extract of Tridax procumbens become effective therapeutic management of *Candida* infections.
3. **Hypotensive effect** : The hypotensive effect of Tridax procumbens leaf was investigated on anaesthetized Sprague-Dawley rat. They showed that leaf of aqueous extract having cardiovascular effect and it has ability to cause significant dose dependant decreases in the mean arterial blood

pressure. The higher dose indicates significant reduction in heart rate whereas lower dose did not cause any changes in the same. They were reported that leaves of *Tridax procumbens* Linn. possess hypotensive effect .

4. **Immunomodulatory** : The ethanol leaf extract of *Tridax* have immunomodulatory effect which was carried out in Albino rats dosed with *Pseudomonas aeruginosa* also inhibits proliferation of same *Tridax procumbens* aqueous extract tested for immunomodulatory activity. Phagocytic index, leukocyte count and splenic antibody secreting cells are significantly increased which was reported to aqueous extract of *Tridax* in ethanolic insoluble fraction Stimulation of humoral immune response was also observed along with elevation in hemagglutination antibody titer. Also, this study reveals that *Tridax* influences both humoral as well as cell mediated immune system .
4. **Antidiabetic activity** : The alcohol and water extract of *Tridax procumbens* Linn. leaves having antidiabetic activity which is significantly decrease in the blood glucose level. Antidiabetic activity tested in the model of alloxan induced diabetes in rats *T. procumbens* methanol extract of 50 percent of acute and sub chronic dose administered by oral shows to reduce fasting blood glucose levels in diabetic rats. This plant material does not affect the sugar levels in normal rats.
5. **Anti-inflammatory** : The anti-inflammatory activity of *Tridax procumbens* extract was assessed on carrageenin induced paw edema along with standard drug, Ibuprofen. The inhibition zone was comparable with extract of *Tridax* and. The *Tridax* extract increased the inhibition of edema if treated with standard drug Ibuprofen. Drug Ibuprofen with extract of *Tridax* showed significant anti-inflammatory activity. Water soluble powder of *Tridax* leaf extract was administered orally at different doses to rats. The results demonstrated that the extract possessed analgesic activity. *Tridax procumbens* L. dose reduced the abdominal writhing *Tridax* alcoholic and hydro alcoholic extract of anti-inflammatory activity by using the rat-paw edema assay and showed edema inhibition in the percentage of 10.82, 16.80 and 11.39.
6. **Antioxidant activity** : The *T. procumbens* having the total phenol expressed as Gallic Acid Equivalent (GAE) show a high phenolic content of 12 mg/g GAE. The result indicates that having some relationship between the content of phenols in medicinal plants and antioxidant activity Many of the earlier reports support this finding that plant secondary metabolites like flavonoids, tannins, catechins and other phenolic compounds possess potent antioxidant activity. The unique bio active compounds played a preventive role in the development of cancer, heart and age-related diseases. They have also been reported to be chemo-preventive agents by lowering cholesterol and repairing damaged cells. The DPPH is a relatively stable Nitrogen centered free radical that easily accepts an electron or hydrogen, it reacts with suitable reducing agents as a result of which the electrons become paired off and the solution loses color depending on the number of electrons taken up. The *Tridax procumbens* extracts were evaluated for in vitro antioxidant activities. DPPH method provides a suitable assessment for the evaluation of in vitro antioxidant activity. It is based on reaction between antioxidant (AH) with nitrogen centered free radical i.e., DPPH (1, 1-diphenyl, 2-picryl hydroxyl). In the methanol extract of ethyl acetate and n-Butanol fractions have shown significant activity. The free radical scavenging activity of the *Tridax procumbens* fractions and Ascorbic acid was measured in terms of hydrogen donating or radical-scavenging ability by using the stable radical DPPH. Low absorbance of reaction mixture indicates higher free radical scavenging Activity.



7. **Hepatoprotective activity** : The aerial parts of Tridax shows hepatoprotective activity. The plant posse's significant protection in alleviation of D-Galactosamine/Lipopolysaccharide (DGalN/ LPS) induced hepatocellular injury. D-GalN/LPS have been proposed to be hepatotoxic due to its ability to destruct liver cells. The multifocal necrosis produced by D-GalN and the lesion of viral hepatitis in humans are similar. This amino sugar is known to selectively block the transcription and indirectly hepatic protein synthesis and as a consequence of endotoxin toxicity, it causes fulminant hepatitis within 8 hrs after administration .
8. **Wound healing activity** : Wound healing is a complex and dynamic process has the ability to restore the cellular structures and tissue layers. Whole plant of Tridax procumbens L. Water extract has ability to set the normal and immune compromised wound healing in rats. Tridax antagonized antiepithelization and tensile strength depressing effect of dexamethasone (a known healing suppressant agent) without affecting anticontraction and antigranulation action. The mechanism of wound healing process of this plant material involves complex interaction between dermal and epidermal cells, the extra cellular matrix, controlled angiogenesis and plasma-derived proteins all coordinated by an array of cytokines and growth factors. The plant not only increase lysyl oxidase but also, protein and nucleic acid content in the granulation tissue, probably due to increase of glycosamino glycan content. Wound healing property of Tridax procumbens aqueous and ethanol extract of whole plant by using animal models. In this study both excision and incision wounds are treated with both extracts of plant. Incision wound treated with extract for 14 days. On 14th day after wound healing capacity is measured by using Tensiometer. A small portion of the incised skin was sent for histopathological examination for assessing reepithelization and collagen formation. In excision wound treated with plant extract for 15 days. Every three days once the changes in wound area were monitored. The wound area was evaluated by using graph paper. Tridax procumbens showed significant increase in Hydroxyproline, Collagen and Hexosamine content which shows the effective wound healing action.
9. **Anticancerous activity** : The anticancer activity of Tridax procumbens was tested on prostate epithelial cancerous cells PC3. Tridax flowers were extracted with water and acetone. Anticancer activity was determined by MTT assay with cell viability. Both extracts were tested on cell viability assay. In this experiment the basic process based on the yellow soluble salt MTT changed into to purple blue insoluble Formazan precipitate. This process carried out by the mitochondrial succinate dehydrogenase which is produced by viable cells. Viable cells are quantified spectrophotometrically at 570 nm. The acetone flower extract showed 82.28 % cancer cell death within 24 hrs and water extract exhibited a very weak anticancer activity. The results of this analysis revealed the fact that flower crude extract has anti-cancer activity .
10. **Antihyperlipidemic activity** : Tridax procumbens leave extract significantly decreased the accumulation of lipid content. By the presence of antioxidant molecules in extract they are having the Antihyperlipidemic activity. This activity tested on HepG2 cells. When the cells are treated with 20 mg/ml of extracts of Tridax procumbens and 1mM of oleic acid, no lipid accumulation observed in HepG2 cells. The leaves extract of Tridax procumbens had significant effect to decrease lipid content in HepG2 cells when compared with the normal model control. Hepatic lipid accumulation and oxidative stress affects leads to Non-Alcoholic Fatty Liver Disease (NAFLD). Thus, we analysed that the antihyperlipidemic of Tridax procumbens leaves would attenuate events leading to NAFLD. The leaf extract of Tridax procumbens may be used as prophylactic agents to prevent the

induced disorders such as atherosclerosis and other. From this our results suggest the potential therapeutic uses of hydroethanolic extract of *Tridax procumbens* in the prevention and treatment of hyperlipidemia and related diseases .

11. **Hemostatic activity** : *Tridax procumbens* leaves of different extract were tested for hemostatic activity. This process carried out by studying the clotting time of 10 human volunteers by in vitro method. Ethanol extract of plant showed positive activity. The ethanolic extract of the *Tridax procumbens* leaf reduces the clotting time uniformly in the blood samples. This study showed that the hemostatic activity, thus affecting haemostasis .
12. **Antiarthritic activity** : The inflammatory disorder which involves damage to one or more joints is known as Arthritis. It is increasing due to the low consumption of fluids, as a result of the hectic lifestyle. Many studies have been done to report the arthritic effect of *Tridax procumbens* ethanol extract at dose of 250 mg/kg and 500 mg/kg. Indomethacin (10 mg/kg) was used as the standard. The whole plant extract of *Tridax procumbens* showed significant anti-arthritic activity in the Freud's Complete Adjuvant model. The results were comparable with that of Indomethacin .
13. **Anti-juvenile hormone activity** : Topical application of fraction of petroleum ether extract of *T. procumbens* showed remarkable effect on metamorphosis of *Dysdercus* and were found to be notable in generating abnormalities in adults due to juvenile hormone activity. Of fifteen plants tested, five plant extracts showed anti-juvenile hormone like activity against laboratory colonized late fourth instar larvae and adult female mosquitoes. Petroleum ether extract of *Eichhornia crassipes* and acetone extracts of *Ageratum conyzoides*, *Cleome icosandra*, *Tagetes erectes* and *T. procumbens* showed growth inhibitory and juvenile hormone mimicking activity to the treated larvae of *C. quinquefasciatus*. Larval pupal intermediates, demalinated pupae, defective egg rafts and adult with deformed flight muscles were few noticeable changes. Biting behavior was observed to be affected only in *ageratum*, *cleome* and *T. procumbens* extracts. Loss of fecundity was observed in the treated mosquitoes but no sterilant effects could be seen Adults, obtained from larvae exposed to the plant extracts produced significantly shorter egg-rafts than in control .
14. **Antidiarrheal / Antisecretory activity** : Alcohol, hexane, chloroform, butanol and aqueous extract of different parts of 31 indigenous medicinal plants of India were screened for their antisecretory activity against *E. coli*. The extract of *T. procumbens* showed highly significant antisecretory activity.
15. **Air growth promoting activity** : The ethanolic extract aerial parts *T. procumbens* was investigated for hair growth promoting properties. It was administered albino rats as 10% ointment as well as orally (100 mg/kg/day) for 20 days both treatments were effective. To total the activity in extract function with different solvents are undertaken and the fraction evaluated for this property petrol fraction was found active. Column chromatography of petrol fraction and screening of same suggested the activity in initial function. Animals are divided in three groups of 25 animals. The rats those receives oral dose of ethanolic extract shows increased growth of the hairs whereas rats of control group remained almost devoid of hair. Some observations were recorded in the animals, which were treated with ointment. It was also observed that till 10th day of treatment there was no activity at all the process of hair growth started by 14th day and was almost complete in 21 days .
16. **Insecticidal activity** : The essential oils isolated from *T. procumbens* exhibited insecticidal activities against house flies, mosquito larvae, *Dysdercus similes* and cockroaches. Essential oils of *T. procumbens* are highly potent, exhibits strong insect repellent activity, when tested against three

varieties of ants. It was observed during the collection of *T. procumbens* that the plant is neither attacked by nor grazed by cattle's suggesting that the plants possess insect repellent or insecticidal activity.

17. **Antimicrobial activity** : Antimicrobial screenings have been done, but additional studies are needed to corroborate some of the results. Various species of bacteria and fungi have shown sensitivity to the antimicrobial properties of *T. procumbens*. More recently, callus of stem and leaf has shown to be useful for the synthesis of silver nanoparticles that showed some antimicrobial activity against *E. coli*, *V. cholerae*, *A. niger*, and *A. flavus*. However, this activity was lower than the activity shown by silver nitrate so these results are not conclusive. Petroleum, ether and ethanolic extracts of leaves of *T. procumbens* showed antibacterial activity against *Bacillus faecalis*. This activity was reported to be probably due to the presence of alkaloids. The chloroform extracts showed antibacterial activity against *B. faecalis*, *B. subtilis*, *E. coli*, and *Pseudomonas aeruginosa* but nothing bacterial and fungal infections. There are some contradictory results about the antimicrobial activity of this species. Some studies did not include significant biological activity compared to the antibiotic control but there is evidence for the potential of this species as anti-microbial so more studies need to be done in this area.
18. **Antiparasitic activity** : Treatment of some diseases caused by protozoal infections like malaria, dysentery, colic, and vaginitis have been assessed with *T. procumbens* through a bioassay guided fractionation with a methanol extract to isolate an active compound, (3,S)-16,17-Didehydrofalcicarinol (an oxylipin). Tridax seemed to have anti-leishmanial activity when using crude extracts from the whole plant. A study done in Ghana tested the antiplasmodial effect of aqueous, chloroform, ethyl acetate, and ethanolic extracts from the flowers, leaves, and stem of *T. procumbens*. There is evidence that the aqueous and ethanolic extracts from the species have anti-plasmodial properties; a study using the tetrazolium-based colorimetric assay showed that *T. procumbens* helped protect red blood cells from *P. falciparum* damage. Tridax shows a great potential against a disease that kills millions of people around the world.
19. **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.
20. **Anti-obesity activity** : In a research investigation, the animal receiving treatment with the plant decoctions showed a significant reduction in total cholesterol, triglycerides, total protein, free fatty acids and elevation of high-density lipoprotein cholesterol level.
21. **Antimalarial activity** : The water and ethanol decoctions have anti-plasmodial properties against chloroquine-resistant *Plasmodium falciparum*. The decoctions have low toxicities to human RBCs though further animal toxicity studies need to be carried out on the plant. The aqueous and ethanolic extracts of PA and TP have anti-plasmodial activity against chloroquine resistant *P. falciparum* parasites. The extracts have considerably low toxicities to human RBCs. These results lend support to claims of herbalists that decoctions of either TP or PA are useful medicines. These

notwithstanding, more comprehensive animal toxicity studies need to be carried out on the plants, especially since humans are currently using them to treat malaria and other diseases.

22. **Antileishmanial activity** : The *Tridax procumbens* leaves extract and the *Allium sativum* extract combined with produce effective action against *Leishmania Mexicana*. To analyse antileishmanial activity in vivo assay was performed on mice injected with *Leishmania Mexicana* promastigotes. The mice were treated with either *Tridax procumbens* extract or *Allium sativum* extract up to 14 days. Then, the 14th day effect was monitored and compared with control group. The liver injury and other acute toxicity parameter were determined by. After 12th week period of infection, the blood sample was collected and determine by non-commercial indirect ELISA with total immune globulins. The result showed an increasing 1 type immune response in mice increased ratio of IgG2a per IgG1 indicates a tendency to raise the immune response. The mixture of both *Tridax procumbens* and *Allium sativum* extract is a promising natural treatment for the crucial disease cutaneous Leishmaniasis .
23. **Anti lithiatic activity** : Ethanol extract of the plant was also used for treating kidney stone disorders. It showed activity against 0.75% v/v ethylene glycol and 2% w/v ammonium chloride induced calcium oxalate urolithiasis, and hyperoxaluria induced oxidative stress in animal models. Treatment with the decoctions of the plant was able to reduce callogenesis induced urinary excretion and renal deposition of calcium oxalate and resultant lipidperoxidation, indicating anti-urolithiasis and anti-oxidant effects.
24. **Repellency activity** : Essential oils were extracted by using steam distillation from leaves of *Tridax procumbens* Linn. The extracted oil was examined against malaria parasite *Anopheles stephensi* in mosquito cages for its topical repellency effects. All essential oils were tested at three different concentrations (2, 4 and 6 percentage). Of these, the essential oils of *Tridax* exhibited relatively high repellency effect (>300 minutes 6 percentage concentration) and concluded that *Tridax* are promising as repellents at the 6-percentage concentration against *Anopheles stephensi* .
25. **Miscellaneous** : The cardiovascular effect of aqueous extract from the leaf of *Tridax* was investigated on anaesthetized Sprague-Dawley rat. The aqueous extract caused significant decreases in the mean arterial blood pressure in a dose-related manner, i.e., the extract caused greater decrease in the mean arterial blood pressure at higher dose than at lower dose also higher dose leads to significant reduction in heart rate whereas lower dose did not cause any changes in heart rate. It means that a leaf of *Tridax* has hypotensive effect 9. In one study, essential oils extracted by steam distillation from leaves *Tridax* were evaluated for its topical repellency effects against malarial vector *Anopheles stephensi* (*An. Stephensi*) in mosquito cages. All essential oils were tested at three different concentrations (2, 4 and 6%). Of these, the essential oils of *Tridax* exhibited relatively high repellency .

## Conclusion

*Tridax procumbens* Linn., a weed native to tropical America and naturalized in various regions including India, Africa, Asia, and Australia, possesses numerous pharmacological activities. Its various parts, including leaves, stems, and roots, have shown beneficial effects such as hepatoprotective (liver-protecting), immunomodulating (modulating the immune system), wound healing, antidiabetic, hypotensive (lowering blood pressure), antimicrobial, insect repellent, anti-inflammatory, antioxidant,

and hair growth promotion properties. The plant has also been used as a bioadsorbent for removing chromium (VI) from industrial wastewater.

The plant is referred to as “Bhringraj” in Ayurveda and has been incorporated into traditional medicines. However, scientific research linking the plant’s phytochemical constituents with their pharmacological properties is limited. Many studies have focused on using plant extracts and qualitatively analyzing their phytochemical composition. To advance the understanding and potential therapeutic applications of *Tridax procumbens*, researchers are encouraged to employ modern drug discovery approaches, such as bio-assay guided phytochemical identification, phenotypic screening using relevant cell culture models, and establishing pharmacokinetic-pharmacodynamic correlations.

Efforts should be made to identify active metabolites responsible for the plant’s efficacy in vivo, allowing for the standardized preparation of extracts. Additionally, researchers can explore various enzyme targets for different diseases and test partially purified bioactives as inhibitors or activators. Molecular modeling, medicinal chemistry, and bioinformatics approaches can aid in identifying new bioactives that could serve as drug leads. By leveraging modern technologies, researchers can further evaluate the pharmacological properties of *Tridax procumbens*. Overall, *Tridax procumbens* possesses significant potential in terms of botanical, phytochemical, nutritional, and pharmacological properties. Extensive utilization of this plant in ancient systems of medicine for various biological disorders, including notable psychopharmacological activities, indicates the need for further research to elucidate its mechanism of action. As a source of herbal drugs, *Tridax procumbens* holds promise for the pharmaceutical industry, and its diverse phytochemical profile offers potential for the development of novel therapeutic agents.

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