



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

Traditional Wisdom Meets Modern Science: Anti-Inflammatory and Wound Healing Insights on *Tridax Procumbens*

Harshali Sonar, Yuvraj Mandlik, Dinesh Pawar, Ashwini Chaudhari, Prashant Shirode*

K. K. Wagh College of Pharmacy, Nashik, Maharashtra, India.

ARTICLE INFO

Published: 05 Jul. 2025

Keywords:

Tridax procumbens, Wound Healing, Anti-inflammatory, Antiproliferative, Anti-arthritis.

DOI:

10.5281/zenodo.15812652

ABSTRACT

The study addresses the pharmacological potential of *Tridax procumbens*, a traditional Indian medicinal plant used to cure a variety of illnesses, including dysentery, diarrhoea, and bronchial catarrh. Its anti-inflammatory qualities are also well-known from an ethnomedical standpoint. The evaluation of the plant's capacity for tissue regeneration and wound healing, particularly regarding inflammation, is the main goal of this study. Standardized *Tridax procumbens* extracts were evaluated for their anti-inflammatory properties in vivo using the carrageenan-induced rat paw oedema experiment. Moreover, the capacity of bioactive substances to inhibit the important inflammatory mediators known as cyclooxygenase (COX-1 and COX-2) enzymes was identified and examined. The phytochemical components of the plant, such as sterols, flavonoids, and polysaccharides that support its pharmacological actions, are also covered in detail in the study. The purpose of the results is to support the traditional use of *Tridax procumbens* in the treatment of hepatic, metabolic, and inflammatory diseases using modern pharmacological techniques.

INTRODUCTION

Injuries to the skin that cause damage to other soft tissues result in wounds. The complex and ongoing process of tissue remodelling and repair in response to damage is known as wound healing.^[1] In India, *Tridax procumbens* (Compositae) is a procumbent, hispid herb that grows as a weed. The

leaves are said to be used in traditional medicine to treat diarrhoea, dysentery, and bronchial catarrh, as well as to restore hair. The tribal healers employ the whole plant poultice as an anti-inflammatory. Pharmacological studies on *Tridax procumbens* previously conducted revealed anti-inflammatory, immunomodulatory, wound healing, Hepatoprotective, anti-leishmanial,

*Corresponding Author: Prashant Shirode

Address: K. K. Wagh College of Pharmacy, Nashik, Maharashtra, India.

Email ✉ : prshirode@kkwagh.edu.in

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



hypoglycemic, anti-hyperglycaemic, and hair growth stimulating effects. The phytochemical analysis demonstrates the isolation of sterols, flavonoids, polysaccharides, fatty components, and derivatives of bergenin from *Tridax procumbens*. In light of *Tridax procumbens*' previously mentioned ethnomedicinal history, and in keeping with our efforts to identify COX-1 and COX-2 inhibitors from Indian medicinal plants. In the carrageenan-induced rat paw oedema assay, the current study details the standardized extracts anti-inflammatory effectiveness in vivo. From recent studies, *Tridax procumbens*' bioactive components are isolated, characterized, and their subsequent in vitro COX-1 and COX-2 inhibitory activities are detailed. [2] The investigation of *Tridax procumbens* pharmacological potential and bioactive constituents is the main goal of the study. The goal of the study is to learn more about the plant's ability to heal wounds, specifically about tissue remodeling and repair. Furthermore, it aims to evaluate the anti-inflammatory effectiveness of *Tridax procumbens* using in vivo research, like the rat paw oedema model generated by carrageenan. Isolating and analyzing the bioactive substances from the plant, with a focus on assessing their capacity to impede COX-1 and COX-2 enzymes, is another important goal. The research endeavours to validate the historic ethnomedicinal usage of this plant with contemporary pharmacological studies, thereby validating its potential for treating inflammatory, hepatic, and metabolic problems.

BOTANICAL DESCRIPTION OF *TRIDAX PROCUMBENS*

Habitat: *Tridax procumbens* is a tropical and subtropical annual or perennial herbaceous weed that grows primarily in meadows, croplands, disturbed areas, landscapes, and roadside during the rainy season.

Growth: With a flowering axis that is 15 to 35 cm high, plants are either prostrate or erect, producing patches.

Genetics: *Tridax procumbens* was recently assigned the chromosomal number $2n=36$

Distribution: Coat buttons, or *Tridax procumbens*, is a type of weed species that frequently grows in open, disturbed habitats in tropical and subtropical countries.

Table No. 1: Botanical classification of *Tridax procumbens*

Kingdom	Plantae
Sub kingdom	Tracheobionta
Division	Spermatophyte
Sub division	Magnoliophyta
Class	Magnoliopsida
Sub class	Asteridae
Order	Asterales
Family	Araceae
Genus	Tridax
Species	Procumbens

Table No. 2: Vernacular Names of *Tridax procumbens*

Hindi	Gharma
Marathi	Kambarmodi, Tantani
Gujarati	Ghadjavu, Ghaburi
Bengali	Tridhara
Assamese	Bikhalyakarani
Sanskrit	Jayanti veda, Avanti
Tamil	Vettukaaya Poondur
Telugu	Gayapaaku, Gaddi Chamanthi
Kannada	Jayanthi
Malayalam	Kumminippacha
Spanish	Cadillo Chisaca
French	Herbe Caille
Japanese	Kotobukigiku
English	Tridax Daisy

MORPHOLOGY

Tridax procumbens is a small, green perennial plant that grows to a height of 15 to 40 cm. It has hairy, procumbent stems that emerge from a woody base, roots that appear at nodes, and oval to



lanceolate leaves with a petiole that ranges from 4 to 30 mm long. There are two varieties of blooms in this plant: disk florets and ray florets. The disk of the corollas is yellow, and the basal placentation ranges from 3 to 6. The tubular base of the florets is tubular and includes ligules that are pale yellow or cream-white in colour. The endosperm of seeds is pendulous; the embryo is missing. ^[3,4]



(A)



(B)



(C)



(D)



(E)



(F)



(G)



(H)

Figure 1: - *Tridax procumbens* (A) Habitat (B) Whole Plant (C) Front view of leaves (D) Back view of leaves (E) Flower (F) Front view of Flower (G) Back view of Flower (H) Root

PHYTOCHEMICAL CONSTITUENT: The following phytoconstituent present in *Tridax procumbens*

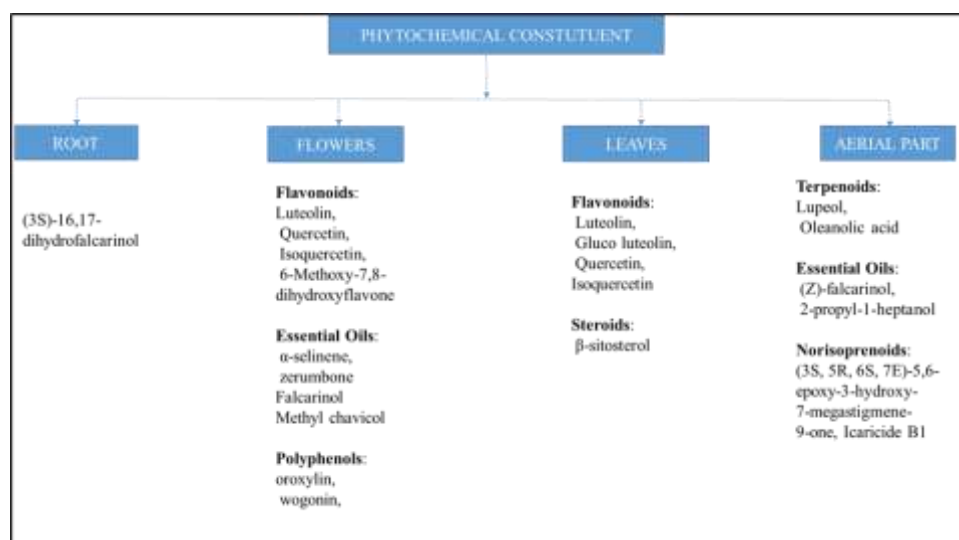


Figure 2: Phytochemical Constituents of *Tridax Procumbens*

The leaves of *Tridax procumbens* contain a variety of compounds that may have therapeutic uses. Numerous bioactive substances, such as steroids, saponins, coumarins, alkaloids, diterpenes, and phenols, were identified through analysis of the chloroform, acetone-water, and chloroform-water extracts. The acetone-water and chloroform-water extracts included tannins and anthocyanins, while

the chloroform extract did not. Furthermore, extracts of acetone-water and chloroform were discovered to contain flavonoids, whereas extracts of chloroform-water and acetone-water were found to contain amino acids. Emodins, proteins, phytosterols, leucoanthocyanins, and cardiac glycosides were among the substances that were consistently lacking. [5] Additionally, the plant

contains plant sterols, such as beta-sitosterol and stigmasterol, which help modulate the immune system and promote cardiovascular health by controlling cholesterol levels and stimulating anti-inflammatory reactions. Furthermore, triterpenes like lupeol, which are present in *Tridax procumbens*, have been connected to anti-cancer activity and have the ability to stop the growth of cancer cells while also stimulating cell regeneration and repair, which helps to heal wounds. Alkaloids and saponins are two more noteworthy phytochemicals that give *Tridax* its antibacterial qualities and help it fight against a variety of bacterial and fungal illnesses. Together, these substances and polysaccharides that boost phagocytic activity to promote immune function highlight the plant's promise as a multipurpose medicinal resource for infection treatment, immune system support, and even chronic disease prevention. [6]

TRADITIONAL USES:

Various rural and tribal tribes in many tropical areas have long used a few native plants as remedies to alleviate illnesses or injuries. One of the most often utilised herbs to treat a variety of illnesses in rural and tribal cultures is *Tridax procumbens*. [7] Across many cultures, *Tridax procumbens*, or "coat buttons," is highly valued in traditional medicine, especially in tropical and subtropical areas. The juice that is taken from its leaves and administered topically to cuts, bruises, and wounds to stop bleeding and infections is its most common usage in wound healing. The plant's capacity to increase the activity of lysyl oxidase, an enzyme essential for collagen cross-linking, speeds up tissue healing and repair. *Tridax procumbens* has been used extensively not just for wound care but also for the treatment of gastrointestinal diseases like dysentery and diarrhoea. The aqueous leaf extract relieves these

ailments by lowering gastrointestinal inflammation and assisting in the regulation of stool motions. The plant's anti-inflammatory qualities are widely known, particularly in the treatment of respiratory disorders like as bronchial catarrh, where it aids in reducing mucus accumulation in the airways and relieving inflammation. In addition to its anti-inflammatory properties, *Tridax procumbens* has long been used as an antimalarial medication. This means that it can lower fever and treat malaria symptoms, which makes it a useful treatment in areas where the illness is common. The plant has also become more well-known in conventional hair care procedures, where the leaf juice is administered topically to the scalp to inhibit hair loss and encourage new hair growth. Due to the abundance of bioactive phytochemicals, such as flavonoids, saponins, tannins, and alkaloids, which support its antibacterial, anti-inflammatory, and therapeutic qualities, this plant has a wide range of applications in traditional medicine. *Tridax procumbens* has a wide range of traditional applications, ranging from respiratory disorders and hair health to gastrointestinal problems and wound care. This highlights the plant's therapeutic relevance and the possibility for more pharmacological research. [8]

THERAPEUTIC ACTIVITIES

Wound Healing Activity

It is a process of regeneration and replacement of lost tissue or damaged tissue by the same type of cell or tissue. The tribal people have used *Tridax procumbens* as a wound healing medicine for centuries following are some recent advances in wound healing approaches using the plant *Tridax procumbens*. *Tridax procumbens* has a wound-healing effect by means of the synthesis of silver nanoparticles. The effects of silver nanoparticles, which are made from leaf extracts of *Tridax*



procumbens, on wound healing were investigated using freshwater catfish, *Pangasius hypophthalmus*. The principal discoveries consist of.

1. Synthesis and Characterization of Silver Nanoparticles: *Tridax procumbens* leaf extracts were combined with silver nitrate to yield silver nanoparticles, which were then visible due to a colour shift. The spherical, roughly 70 nm-sized nanoparticles were examined using scanning electron microscopy (SEM) and UV-vis spectroscopy.

2. The process of wound healing: *Pangasius hypophthalmus* was given artificial wounds, and the fish were treated in three groups: with silver nitrate, with *Tridax procumbens* extract, and with silver nanoparticles. In comparison to the other groups, the silver nanoparticle-treated group exhibited the quickest and fullest healing, as evidenced by increased collagen deposition and quicker epithelialization.

3. Histological Analysis: The application of silver nanoparticles considerably accelerated tissue healing, as revealed by microscopic analysis. Silver nanoparticle-treated wounds displayed the most advanced healing with well-formed collagen and re-epithelialization on the tenth day. Based on the study's findings, *Tridax procumbens* derived silver nanoparticles are very successful at accelerating wound healing. The 50% genetic similarity between *Pangasius hypophthalmus* and humans suggests that these nanoparticles may find use in mammalian wound healing in the future.^[1]

Mechanism of Wound Healing: It involves the following steps:

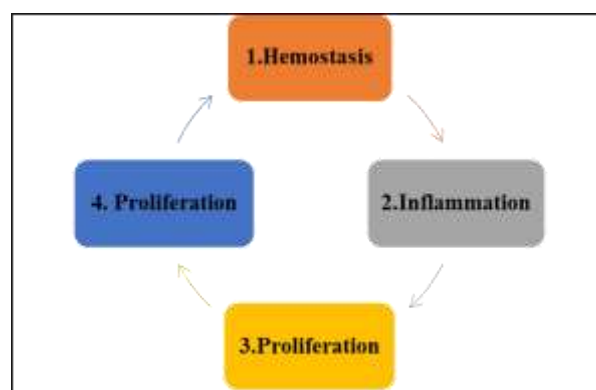


Figure 3: Mechanism of Wound Healing

Wound healing active agent:

Tridax procumbens contains a lot of triterpenoid substances, especially β -sitosterol and lupeol. Triterpenoids have anti-inflammatory abilities and assist the healing of wounds by promoting the formation of collagen and regulating immunological responses.

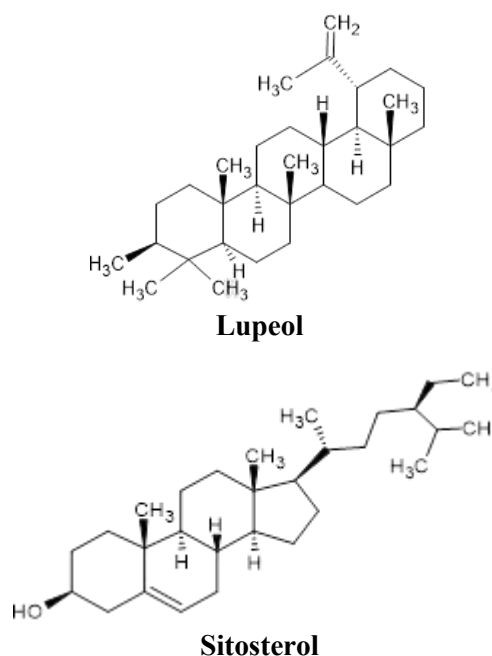


Figure 4: Wound healing active agent

Wound healing effect in diabetic and non diabetic experimental animals:

The effectiveness of the medicinal plant *Tridax procumbens*, which has been used for centuries to treat wounds, has been evaluated in laboratory

animals with and without diabetes. To evaluate their therapeutic potential, the study used ethanolic extracts of its leaves (EETP) in a variety of formulations.

Wound Healing Activity: Both diabetic and non-diabetic rats' wounds healed far more quickly after exposure to an ethanolic extract of *Tridax procumbens*, according to the study. When compared to the control group, diabetic mice treated with 5% EETP had the greatest wound contraction and the quickest epithelization duration, suggesting improved healing. Comparably, the 5% EETP therapy produced full healing in non-diabetic mice, surpassing both lower and control extract concentrations. The mechanism involves the secondary metabolites with anti-inflammatory and antioxidant capabilities, like flavonoids and tannins, which are considered to be responsible for the therapeutic qualities. Through improving collagen deposition and lowering oxidative stress at the wound site, these substances may promote wound healing.

Comparative Efficacy: EETP, especially at the 5% concentration, showed wound healing capabilities that were on par with the usual treatment (Faramycin sulfate cream).

The results validate the traditional application of *Tridax procumbens* in wound healing, suggesting that it may be a useful natural remedy for improving healing in both non-diabetic and diabetic circumstances. The study emphasizes the value of phytochemicals in aiding in the healing of wounds and calls for more research into the precise mechanisms and active ingredients underlying these benefits. [9]

Anti-Inflammatory Activity

The anti-inflammatory effect of *Tridax procumbens* was extensively researched utilizing

its ethyl acetate, methanol, and 70% ethanol extracts. The carrageenan-induced rat paw oedema model is a commonly used technique to evaluate extracts for anti-inflammatory properties. All three extracts demonstrated a significant reduction in paw oedema at a middle dose of 200 mg/kg, suggesting that they may have anti-inflammatory properties. The most effective of these was the ethyl acetate extract, which decreased paw oedema by 41.2% and 43.5% after three and five hours, respectively. As the positive control, ibuprofen had an impact similar to this one. The observed reduction in inflammation is associated with the suppression of cyclooxygenase enzymes, particularly COX-1 and COX-2, which are crucial for the synthesis of prostaglandins that promote inflammation. At 50 µg/mL, the ethyl acetate extract exhibited the strongest suppression of COX-1 and COX-2, followed by the methanol and ethanol extracts. Subsequent investigation demonstrated that the *Tridax procumbens* COX inhibitory effect is largely attributed to chemicals that have been isolated from the plant, including bergenin and centaurein. Centaurein demonstrated a lesser degree of COX-1 and COX-2 inhibition than bergenin. Apart from their inhibition of COX enzymes, the extracts exhibited antioxidant properties. The antioxidant capability was evaluated using assays that scavenge free radicals, like the DPPH and ABTS tests. The methanol extract demonstrated the greatest free radical scavenging activity, followed by the ethyl acetate and ethanol extracts. Still, in comparison to common antioxidants such as Trolox and ascorbic acid, the antioxidant activity was not as strong. Because carrageenan-induced inflammation is biphasic, involving the release of prostaglandins, serotonin, and histamine, likely, *Tridax procumbens* acts as an anti-inflammatory during the later stages of the inflammatory response, when prostaglandins predominate. This is consistent with the plant extracts' COX inhibitory



action, especially their capacity to reduce prostaglandin synthesis, which is essential for the development of chronic inflammation. Therefore, the combined actions of *Tridax procumbens* the inhibition of COX enzymes and antioxidant activity, can be credited with its anti-inflammatory properties. These results validate its traditional application in the treatment of inflammatory diseases, where its pharmacological benefits are mostly attributed to flavonoids such as bergenin and centaurein. From the above study, we can conclude that *Tridax procumbens* has potent anti-inflammatory activity. [2,10]

Antifungal Activity

The Inhibitory effect of *Tridax procumbens* against Human Skin Pathogen details a study on the antifungal properties of *Tridax procumbens*, a medicinal herb traditionally used to treat skin diseases. The beneficial effects of the well-known medicinal herb *Tridax procumbens* against a variety of human skin pathogens, such as *Microsporum fulvum*, *Microsporum gypseum*, *Trichophyton mentagrophytes*, *Trichophyton rubrum*, *Trichosporon beigeli*, and *Candida albicans*, have been investigated about its antifungal activity. With low minimum inhibitory concentrations (MIC) and outstanding antifungal activities, *Tridax procumbens* methanol extract has shown promise as a medicinal agent. Many skin diseases are treated with this herb in traditional medicine, and new research has confirmed that it has therapeutic benefits. After the methanol extract was fractionated using dichloromethane, an oily, viscous fluid full of bioactive chemicals was produced and examined further 26 chemicals were found by gas chromatography-mass spectrometry (GC-MS) examination; the main ingredients include 5 α -cholestane, hexadecanoic acid ethyl ester, 9-octadecenoic acid ethyl ester, and 9,12-

octadecadienoic acid ethyl ester. *Tridax procumbens* has the potential to be antifungal because of these substances, which are also known for their cytotoxic, antimicrobial, and antifungal characteristics. Using the agar well diffusion method, the antifungal activity of the extract and its fractions was assessed. The results demonstrated a considerable suppression of dermatophytes, with zones of inhibition ranging from 17 to 32 mm. It was more likely to impact *Candida albicans*, while *Trichophyton mentagrophytes* was less vulnerable. The antifungal action of *Tridax procumbens* is probably influenced by its bioactive constituents, which include phenols, flavonoids, saponins, sterols, and fatty acids. In addition, the dichloromethane fraction's unsaturated fatty acids have been linked to strong antidermatophytic properties. This study highlights *Tridax procumbens* potential as a natural remedy for treating fungal infections and offers compelling data in support of its application in conventional medicine. Its therapeutic potential and effectiveness in treating human fungal infections require further investigation, including in vivo clinical trials. [11]

Antibacterial Activity

The antibacterial properties of the plant's leaf extracts are investigated in "Phytochemical and antibacterial studies of leaves of *Tridax procumbens* L." The study looks into the antibacterial properties of petroleum ether, chloroform, and ethanolic extracts as well as their phytochemical content. The agar well diffusion method was used to assess the antibacterial activity against a variety of bacteria, including Gram-positive (*Bacillus faecalis* and *Bacillus subtilis*) and Gram-negative (*Escherichia coli* and *Pseudomonas aeruginosa*) species. Similar to the common antibiotic ampicillin, the chloroform



extract showed the most potent antibacterial action, especially against *Bacillus faecalis* and *E. coli*.^[12,13]

Antioxidant Activity

The study on the antioxidant activity of standardized extracts of *Tridax procumbens* L. investigates the antioxidant activity of the plant's aerial parts using ethyl acetate, methanol, and 70% ethanol extracts. Using DPPH and ABTS radical scavenging assays, the antioxidant activity of *Tridax procumbens* extracts was investigated. The methanol extract showed the highest potency when compared to the ethyl acetate and 70% ethanol extracts. These tests assess the extracts' capacity to combat free radicals, which are dangerous substances that aggravate oxidative stress and inflammation in living organisms. The findings showed that the extracts had moderate to strong free radical scavenging properties, yet they performed less well than ascorbic acid and trolox, two well-known antioxidant benchmarks. The increased quantity of flavonoids and polyphenols, such as bergenin and centaurein, which are both recognised for their antioxidant qualities, may have contributed to the methanol extract's exceptional activity. However, these isolated compounds have less powerful antioxidant properties than the crude extracts; these separated components nevertheless add to the total antioxidant capacity. The possible anti-inflammatory activities of *Tridax procumbens* extracts may be supported by their capacity to scavenge free radicals, indicating a substantial role in reducing oxidative damage. These extracts' antioxidant activity and cyclooxygenase (COX) inhibition demonstrate their therapeutic promise in treating inflammatory disorders, as oxidative stress is a major factor in inflammatory ailments. This underlines the value of natural antioxidants in reducing cellular damage and promoting health,

supporting the traditional usage of *Tridax procumbens* in the management of inflammatory illnesses.^[2,14]

Antihypertensive Activity

Tridax procumbens aqueous leaf extract exhibits potent antihypertensive activity. Since they are safer and more natural alternatives to prescription drugs, plants with antihypertensive effects are becoming more and more popular. *Tridax procumbens* is one such plant that has demonstrated encouraging outcomes in the treatment of high blood pressure. Research using the chemical N-nitro-L-arginine-methyl ester, which induces hypertension in rats, showed that *Tridax procumbens* aqueous leaf extract significantly reduces blood pressure. The extract relaxes blood arteries by lowering the calcium influx that causes the vessels to contract, in a manner akin to that of calcium channel blockers. Furthermore, because *Tridax procumbens* aqueous leaf extract has a high concentration of flavonoids and saponins, which enhance blood flow and shield blood vessels from harm, it has potent antioxidant qualities. *Tridax procumbens* not only lowers blood pressure but also supports reproductive health, which is frequently harmed by hypertension. The extract raised testosterone levels, enhanced fertility, and improved sperm health in treated rats. This shows that, without the negative side effects associated with standard antihypertensive medications, *Tridax procumbens* aqueous leaf extract not only reduces blood pressure but also enhances male reproductive function overall. *Tridax procumbens* is a viable natural remedy for treating hypertension and its associated problems in light of these advantages.^[15]

Hepatoprotective Activity



The plant *Tridax procumbens* Linn. (Asteraceae) has been studied for its hepatoprotective effects against rifampicin-induced hepatotoxicity in male albino rats. Rifampicin first-line treatment for tuberculosis drugs, rifampicin, has been shown to induce oxidative stress and decrease liver function, which can result in substantial liver damage. Liver damage was demonstrated in the experiment by higher levels of liver enzymes such as ALT, AST, and ALP following rifampicin treatment. Additionally, it resulted in decreased glutathione (GSH) and glycogen levels in the liver, decreased antioxidant enzyme activity (SOD and CAT), and increased lipid peroxidation (measured by TBARS). Furthermore, there was a notable decrease in total serum protein and a marked elevation of bilirubin, both of which indicate compromised liver function. Ten days of co-administration with *Tridax procumbens* extract at different doses (100, 200, and 400 mg/kg) resulted in a dose-dependent reversal of these harmful effects. The extract improved serum protein, GSH, and antioxidant enzyme activity while markedly lowering ALT, AST, ALP, and bilirubin levels. Significantly, the highest dose (400 mg/kg) had the strongest hepatoprotective impact, as evidenced by liver function marker values that were almost identical to those of untreated, normal controls. Moreover, the plant extract decreased lipid peroxidation and increased the amount of glycogen in the liver. The hepatoprotective effect was further supported by histopathological investigation, which revealed that the treated rats' liver architecture was normal in contrast to the necrosis and inflammation shown in the group that received rifampicin. These results confirm the traditional usage of *Tridax procumbens* in the treatment of liver problems by suggesting that it enhances antioxidant defence systems and improves liver function to successfully alleviate hepatotoxicity caused by rifampicin. ^[16]

Antiproliferative activity

The extracts of the plant *Tridax procumbens* were separated into different fractions and tested on multiple human cancer cell lines (e.g., PC-3, A549, A431, MDA-MB-231, COLO-205) using MTT assays. The chloroform fraction of the stem showed significant inhibition against breast and skin cancer cells, with IC₅₀ values of 23.41 µg/mL and 29.45 µg/mL, respectively. The study highlights that *Tridax procumbens* contains bioactive compounds with therapeutic potential, particularly in inhibiting cancer cell proliferation and offering antioxidant benefits. ^[17]

Anti-arthritic activity

Rheumatoid arthritis (RA) is a common chronic and systemic autoimmune disorder characterized by inflammation of the synovial joints and concomitant destruction of cartilage and bone. The presence of phytoconstituents such as steroids and flavonoids might be responsible for the anti-arthritic property of *Tridax procumbens*. Through a comprehensive study employing its ethanolic leaf extract in an experimental model of complete Freund's adjuvant (CFA)-induced arthritis in male Wistar rats, the anti-arthritic potential of *Tridax procumbens* was evaluated. Pro-inflammatory cytokines such as TNF-α, IL-1β, and IL-6 are major contributors to rheumatoid arthritis, a chronic autoimmune disease that causes severe inflammation, joint deformities, and disability. In this work, 0.1 ml of CFA was injected into the hind paw to cause arthritis. Evaluations were conducted using metrics such as body weight changes, haematological indicators, histological investigations of the knee joints, and hind paw swelling. When compared to the conventional medications, it has been demonstrated that the ethanolic extract of *Tridax procumbens* (TPEE) at a dose of 300 mg/kg considerably reduced the pathological conditions linked to arthritis in



comparison to the common medications Cyclophosphamide (8 mg/kg) and Diclofenac sodium (10 mg/kg). The capability of TPEE to stabilize body weight, lessen paw oedema, and lower the number of inflamed nodes demonstrated its anti-arthritis efficacy. Haematological improvements were noted, including normalised haemoglobin, WBC, and RBC levels as well as a significant decrease in rheumatoid factor (RF) and erythrocyte sedimentation rate (ESR). The effectiveness of TPEE was further corroborated by the histological analysis of knee joints, which showed that treated animals had lower neutrophil infiltration, periarticular erosion, and synovial inflammation, all of which were indicative of the extract's protective effects on bone integrity and joint cartilage. Bioactive substances, including sterols and flavonoids, which are known to block important inflammatory pathways, are responsible for the extract's anti-inflammatory and immunomodulatory qualities. These substances, in addition to the plant's wound-healing and antioxidant qualities, improve its therapeutic potential. The pharmacological actions of *Tridax procumbens*, including its anti-inflammatory, analgesic, immunomodulatory, and wound-healing qualities, have been shown in earlier research and may be a factor in its overall effectiveness in treating arthritis. The ethyl acetate extract of *Tridax procumbens* (TPEAE) was less effective at the same dose than the ethanolic extract, which demonstrated strong anti-arthritis activity. This suggests that the active chemicals are more concentrated or are extracted more successfully with ethanol. Even with encouraging outcomes, more research is necessary to identify and describe the precise phytoconstituents causing the anti-arthritis effects and to completely clarify the underlying processes through which *Tridax procumbens* regulates the immune and inflammatory responses in rheumatoid arthritis. Its potential as an adjuvant or alternative treatment for

human arthritis would also benefit from long-term research and clinical trials. ^[18]

Future prospective:

Future studies should examine the medicinal plant *Tridax procumbens* more thoroughly because it has great potential in a variety of therapeutic and environmental fields. Its well-established antiproliferative activities on a range of cancer cell lines point to potential uses in the treatment of cancer, particularly in research aimed at identifying and isolating the precise bioactive substances that stop tumour growth. Additionally, by focusing on routes like COX enzyme inhibition, its strong anti-inflammatory and immunomodulatory qualities provide new opportunities for the treatment of autoimmune illnesses and chronic inflammatory conditions. Studies on the creation of nanoparticles, such as *Tridax*'s silver and manganese dioxide particles, have shown improved antibacterial activity, suggesting that they may be used to treat drug-resistant infections and hasten wound healing, particularly in diabetic wounds where healing is impeded. *Tridax* is a natural choice for blood pressure control because of the antihypertensive action seen in animal models, which also points to cardiovascular advantages. Its environmentally friendly uses, like wastewater treatment and colour degradation using nanoparticles, go beyond medical applications and demonstrate its wider promise in environmental biotechnology. Going forward, incorporating *Tridax procumbens* into mainstream healthcare, confirming its safety, and broadening its use in contemporary medicine will require standardizing extracts for consistent therapeutic efficacy in addition to conducting thorough clinical trials.

CONCLUSION



Numerous pharmacological studies have demonstrated the effectiveness of *Tridax procumbens* L. in anti-inflammatory and wound-healing applications, making it a valued herb in traditional medicine. Its ethnobotanical benefits are validated by the variety of bioactive chemicals found in this plant, which demonstrate its capacity to change inflammatory responses by inhibiting COX-1 and COX-2. There are encouraging prospects for treating a range of inflammatory, hepatic, and metabolic conditions as long as studies are conducted to better understand their mechanisms of action and refine extraction techniques. To fully understand its therapeutic potential and create uniform guidelines for its use, future research, especially extensive clinical trials, is crucial to incorporating herbal medicine into contemporary healthcare procedures.

REFERENCES

1. Ravindran J, Arumugasamy V, Baskaran A. Wound healing effect of silver nanoparticles from *Tridax procumbens* leaf extracts on *Pangasius hypophthalmus*. *Wound Med.* 2019;27(1):100170. doi:10.1016/j.wndm.2019.100170.
2. Jachak SM, Gautam R, Selvam C, Madhan H, Srivastava A, Khan T. Anti-inflammatory, cyclooxygenase inhibitory and antioxidant activities of standardized extracts of *Tridax procumbens* L. *Fitoterapia.* 2011;82(2):173-177. doi:10.1016/j.fitote.2010.08.016.
3. Kaushik D. Ethnopharmacological and phytochemical studies of *Tridax procumbens* Linn: A popular herb in Ayurveda doi:10.17577/IJERTV9IS090426. *Medicine. Int J Eng. Res.* 2020;9. doi:10.17577/IJERTV9IS090426.
4. Ingole VV, Mhaske PC, Katade SR. Phytochemistry and pharmacological aspects of *Tridax procumbens* (L.): A systematic and comprehensive review. *Phytomedicine Plus.* 2022;2(1):100199. doi:10.1016/j.phyplu.2021.100199.
5. Sawant RS, Godghate AG. Preliminary phytochemical analysis of leaves of *Tridax procumbens* Linn. *Int J Sci Environ Technol.* 2013;2(3):388-394.
6. Ikewuchi CC, Ikewuchi JC, Ifeanacho MO. Phytochemical composition of *Tridax procumbens* Linn leaves: potential as a functional food. *Food Nutr Sci.* 2015;6:992-1004. doi:10.4236/fns.2015.611103.
7. Preveena J, Bhore SJ. Identification of bacterial endophytes associated with the traditional medicinal plant *Tridax procumbens* Linn. *Anc Sci Life.* 2013;32(3):173-177. doi:10.4103/0257-7941.123002.
8. Dattaray D. Traditional uses and pharmacology of plant *Tridax procumbens*: A review. 2022;13(5):511-517. doi:10.31858/0975-8453.13.5.511-517.
9. Shrivastav A, Mishra AK, Abid M, Ahmad A, Fabuzinadah M, Khan NA. Extracts of *Tridax procumbens* Linn leaves cause wound healing in diabetic and non-diabetic laboratory animals. *Wound Med.* 2020; 29:100185. doi:10.1016/j.wndm.2020.100185.
10. Tan Z, Chen C, Chen L, Zeng J, Zhang W, Xu J, He X, Wang Y. Cytotoxic and anti-inflammatory polyacetylenes from *Tridax procumbens* L. *Phytochemistry.* 2024; 225:114191. doi:10.1016/j.phytochem.2024.114191.
11. Policegoudra RS, Chattopadhyay P, Aradhya SM, Shivaswamy R, Singh L, Veer V. Inhibitory effect of *Tridax procumbens* against human skin pathogens. *J Herbal Med.* 2014;4(2):83-88. doi:10.1016/j.hermed.2014.01.004.
12. Christudas S, Kulathivel TM, Agastian P. Phytochemical and antibacterial studies of leaves of *Tridax procumbens* L. *Asian Pac J*



- Trop Biomed. 2012;2(1 Suppl). doi:10.1016/S2221-1691(12)60149-X.
13. Veena MA, Hemanth Kumar CM, Majani SS, Munirajappa NN, Harendra B, Shivamallu C, Raghavendra HL, Shati AA, Alfaifi MY, Elbehairi SEI, Kollur SP. Eco-friendly synthesized manganese dioxide nanoparticles using *Tridax procumbens* as a potent antimicrobial and dye degrading agent. *Results Chem.* 2024; 7:101290. doi:10.1016/j.rechem.2023.101290.
 14. Syed A, Benit N, Alyousef AA, Alqasim A, Arshad M. In-vitro antibacterial, antioxidant potentials and cytotoxic activity of the leaves of *Tridax procumbens*. *Saudi J Biol Sci.* 2020;27(2):757-761. doi:10.1016/j.sjbs.2019.12.031.
 15. Salami SA, Salahdeen HM, Rahman OC, Murtala BA, Raji Y. Oral administration of *Tridax procumbens* aqueous leaf extract attenuates reproductive function impairments in L-NAME induced hypertensive male rats. *Middle East Fertil Soc J.* 2017;22(3):219-225. doi:10.1016/j.mefs.2017.03.001.
 16. Wagha SS, Shinde GB. Investigation of hepatoprotective and antioxidant activity of *Tridax procumbens* Linn. (Asteraceae) extract against rifampicin-induced hepatotoxicity in male albino rats. *Mater Today Proc.* 2018;5(10 Pt 3):22605-22613. doi:10.1016/j.matpr.2018.06.634.
 17. Sagheer R, Gupta A, Luqman S, Kaur H, Srivastava K, Kawish SM, Panda SK, Iqbal M. Antiproliferative and antioxidant potential of *Tridax procumbens* extracts against various human cancer cell lines: An insight for medicines from weeds. *J King Saud Univ Sci.* 2024;103474. doi:10.1016/j.jksus.2024.103474.
 18. Jain DK, Patel NS, Nagar H, Patel A, Chandel HS. Anti-arthritis activity of *Tridax procumbens* ethanolic extract of leaves. *RGUHS J Pharm Sci.* 2012;2(4):80-86. DOI: 10.5530/rjps.2012.4.1.11 DOI: 10.5530/rjps.2012.4.1.11

HOW TO CITE: Harshali Sonar, Yuvraj Mandlik, Dinesh Pawar, Ashwini Chaudhari, Prashant Shirode, Traditional Wisdom Meets Modern Science: Anti-Inflammatory and Wound Healing Insights on *Tridax Procumbens*, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 7, 677-689. <https://doi.org/10.5281/zenodo.15812652>

