

Review

Ethnomedicinal Studies of *Tridax procumbens* L. (Family: Asteraceae)

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DOI: 10.62896/mra.1.2.02

Conflict of interest: NIL

Article History

Received: 15/08/2026

Accepted: 02/09/2026

Published: 02/09/2026

Abstract:

Tridax procumbens L. of Asteraceae family is one of the most common weed found throughout the state of Odisha, India. It is popularly known as coat buttons or Ghamra. This plant has shown an extensive range of traditional ethnomedicinal uses of plant parts, particularly leaves and aerial portions, in the management of wound, skin disease, bleeding, fever, cough, diarrhea, dysentery, inflammation, liver problems, and hair loss. The plant is known to be used in traditional Ayurvedic system of medicine for management of various diseases as a substitute or complementary to Bhringraj. Phytochemical constituents reported from the plant include flavonoids, alkaloids, tannins, saponins, carotenoids, terpenoids, phytosterols, fatty acids, etc (Gubbiveeranna & Nagaraju, 2016; Ingole et al., 2022). Various pharmacological properties have also been reported from the plant including wound healing, antimicrobial, antioxidant, and anti-inflammatory activities among others. Reports by Udupa et al. (1991) have revealed the effect of *T. procumbens* on wound healing and lysyl oxidase activity, which have been supported by recent studies. The present study focused on the ethnomedicinal practices of *T. procumbens* in the state of Odisha as it is a common plant used by the tribal and surrounding villagers of Odisha, particularly Koraput district. However, the traditional uses of the plant do not necessarily imply clinical evidence. More preclinical and clinical trials are needed to ascertain its dose-dependent effect, toxicity, dose, active constituents, and efficacy before it can be recommended for medicinal uses. This review aimed to highlight the botanical description, ethnomedicinal practices, phytochemistry, pharmacology, and future prospects of *T. procumbens*.

Keywords: *Tridax procumbens*, Asteraceae, ethnomedicine, medicinal plants, traditional knowledge, wound healing, phytochemicals, tribal medicine, Odisha.

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1. Introduction

Medicinal plants have contributed significantly to mankind's healthcare for centuries. This knowledge encompasses an extended set of data about the use of herbal botanic products in traditional societies,

including a vast range of methods related to harvesting, preparation, and application. Ethnomedicine is an essential source of information for pharmacological research, as it contains valuable data concerning biological activity of plant substances.

Among the wide range of medicinal flora, *Tridax procumbens* L. (Asteraceae) stands out as a therapeutically promising species. It is also known as coat buttons, Ghamra (Hindi), Dagadipala (Marathi), Jayanti Veda (Sanskrit), and is relatively widespread in India, where it is considered to be a weed growing in agricultural fields, along roadsides, and wastelands. It was described in the pharmacological literature with a special emphasis on its traditional use (Ghosh et al., 2019; Ingole et al., 2022).

Traditionally, it has been used in ethnomedicine for the treatment of various diseases and health conditions. Thus, the fresh leaves of *T. procumbens* were used for stopping wounds and bleeding (Ghosh et al., 2019). In addition, it was reported to have antimicrobial, hepatoprotective, anti-inflammatory, and antidiarrheal effects, as well as being used for skin diseases, fever, cough, dysentery, and hair loss treatment (Saraf et al., 1991). What is more, it has been used as a medicinal plant for hair growth promotion and was linked to an Ayurvedic term Bhringraj (Saraf et al., 1991).

The species' traditional use has prompted scientific investigations needed to confirm its therapeutic prepositions. The research data concerning *T. procumbens* have been published in several studies, including a comprehensive review that listed over 138 isolated or identified compounds (Ingole et al., 2022). In pharmacology, flavonoids and terpenoids are regarded as physiologically active substances, which can confirm the observed therapeutic effects of the species (Ingole et al., 2022). Several studies also demonstrated antimicrobial and antioxidant activities of coat buttons, as well as anti-inflammatory and healing properties (Jangid et al., 2025; Jachak et al., 2011).

This botanic species is regarded as one of the most common medicinal plants in India, where it has been used by indigenous people for centuries (Ingole et al., 2022). In one of the studies conducted among the tribal people of Kundra Block, Koraput district, Odisha, India, it was isolated as a species with antimicrobial potential (Behera & Mahalik, 2022). Thus, it can be suggested that *T. procumbens* is an example of a therapeutically promising species that demonstrates antimicrobial and anti-inflammatory effects and was traditionally used for the treatment of various diseases.

Therefore, the present article aims to demonstrate the ethnomedicinal importance of *T. procumbens*, including its uses in traditional medicine for treating ailments, parts of plants used, and preparation methods.

2. Objectives

The objectives of the present review include;

1. To document the ethnomedicinal importance of *Tridax procumbens* L.
2. To describe the botanical features and distribution of the species.
3. To summarize the traditional uses of the plant parts.
4. To provide an account of phytochemical constituents of *T. procumbens*.
5. To compile scientific reports on the pharmacological properties of the species in support to the traditional claims made.
6. To highlight the ethnomedicinal importance of *T. procumbens* to the tribal and rural people.
7. Finally, the lacunae in research and future approaches for medicinal uses of this plant would be discussed.

3. Botanical Description

Scientific classification

Taxonomic category	Classification
Kingdom	Plantae
Division	Phanerogames
Class	Dicotyledonae
Sub Class	Gamopetalae
Series	Inferae
Order	Asterales
Family	Asteraceae
Genus	Tridax
Species	<i>Tridax procumbens</i> .

The *Tridax procumbens* is an annual or perennial herbaceous plant that typically grows prostrate or semi-erect. The plant has a branching stem that grows horizontally and has opposite leaves. The leaves are ovate to lanceolate and often have serrated edges. The flowers are arranged in a composite head characteristic of the Asteraceae family. The plant has showy white

rays and yellow disks. The fruit is an achene that has a pappus for wind dispersal.

The species is widely distributed in India and is commonly found in disturbed habitats, agricultural lands, roadsides, and wastelands. It has the ability to thrive in different environments and has a fibrous root system that makes it more widespread (Ghosh et al., 2019).



Figure 1. Photo of *Tridax procumbens* L.

4. Ethnomedicinal Importance

The ethnomedicinal information on *T. procumbens* relates to various parts of the plant, namely leaves, aerial parts, flowers, stems, roots, and the whole plant. However, leaves and aerial parts seem to be the most critical contributors to the traditional use of the species.

Table 1. Major ethnomedicinal uses reported for *Tridax procumbens*

Plant part	Traditional preparation/use	Reported application
Leaves	Fresh juice/paste	Wounds and cuts
Leaves	Crushed fresh leaves	Bleeding and skin injuries
Leaves	Decoction	Fever and gastrointestinal complaints
Aerial parts	Extract/preparation	Hair growth

Plant part	Traditional preparation/use	Reported application
Whole plant	Traditional preparations	Inflammatory disorders
Leaves/whole plant	Extract/decoction	Diarrhoea and dysentery
Leaves	Paste/extract	Skin infections
Plant preparations	Traditional formulations	Liver-related disorders
Leaves/plant	Traditional preparations	Cough and fever
Whole plant	Folk preparations	Certain parasitic conditions

Traditional medicinal literature suggests that leaves were most valued for treating wounds and controlling hemorrhages. Reviews on ethnomedicinal literature report the application of crushed leaves directly on the wound surface and damaged skin.

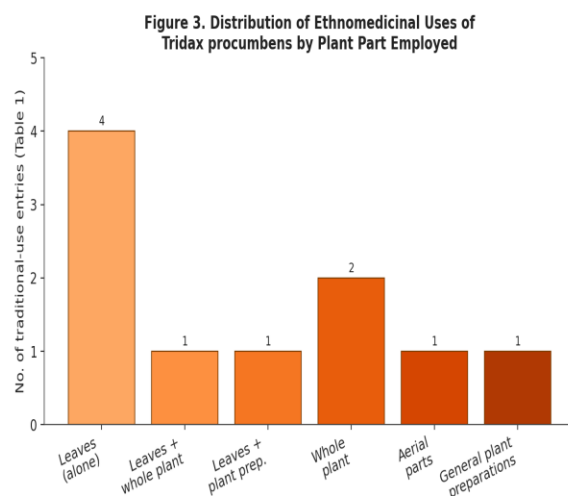


Figure 3. Distribution of the ten traditional-use entries summarized in Table 1, grouped by the plant part employed. Leaves (used alone or combined with the whole plant) account for the majority of documented ethnomedicinal applications.

5. Traditional Use in Wound Healing

Wound healing is probably one of the best studied traditional uses of *T. procumbens*. In several ethnomedical traditions, leaves of this plant are crushed into a paste or juiced and applied to wounds.

This ethnomedical hypothesis was later supported by experimental studies. Udupa et al. (1991) examined the effect of *T. procumbens* extract on lysyl oxidase activity and wound healing process in experimental animals. The study demonstrated that lysyl oxidase activity, protein content and wound-breaking strength were increased, suggesting that this plant may affect collagen formation and connective tissue repair.

The effect of *T. procumbens* extract on lysyl oxidase was further studied by Udupa et al. (1995), who also report an increase in biochemical parameters associated with enhanced wound healing process. In addition, the wound-healing properties of leaf extracts of *T. procumbens* were recently examined in normal and diabetic experimental models and ethnomedical wound healing extract (Hemashenpagam et al., 2023). Overall, these studies helped elucidate the mechanism by which this plant may promote wound healing, and further supported the ethnomedical practice.

Thus, it can be suggested that the traditional use reports of *T. procumbens* were instrumental in pharmacological investigations of this plant.

6. Use in Skin Disorders

Traditional communities have used preparations of *T. procumbens* for the treatment of skin ailments and infections. Leaves or their extracts have been applied topically to the affected areas. The rationale for such use may be explained by the antimicrobial and anti-inflammatory effects that some of the plant's extracts have demonstrated.

Indeed, phytochemical screening has revealed the presence of flavonoids, tannins, terpenoids, and other compounds. Recent study by Hemashenpagam et al. (2023) found flavonoids, tannins, and terpenoids in the examined extract and evaluated their antimicrobial and wound-healing properties. In addition, the antibacterial potential of leaf extract against bacteria isolated from human skin infection was confirmed by Nandi et al. (2022) and Shanmugapriya et al. (2017). However, it is essential to note that topical use of the plant's extracts for the treatment of skin ailments is not to be confused with appropriate dermatological treatment; clinical trials are necessary.

7. Use against Fever, Cough and Gastrointestinal Disorders

Traditional medicinal texts reveal that *T. procumbens* has been used for treating fevers, cough, diarrhoea and dysentery. Ethnobotanical surveys in different geographical localities have documented the use of the leaves or other plant parts as remedies.

For example, an ethnobotanical survey in central Nigeria established that *T. procumbens* was used by the local people as a remedy for cough and other ailments associated with the digestive tract, using the fresh leaves (Bhat et al., 1990).

In another survey, traditional uses of the plant were reported, including the management of bronchial catarrh, dysentery and diarrhoea (Jangid et al., 2025). This suggests that the plant has an extended ethnomedical profile beyond the management of wounds.

8. Use in Hair Growth and Ayurvedic Medicine

One of the traditional indications of *T. procumbens* is related to hair-care and hair-growth properties. This species has been reported in the ethnophytobibliography as a substitute or complement of Bhringraj.

The pharmacological study conducted by Saraf et al. (1991) on hair-growth promoting effects of an ethanolic extract of the aerial parts of *T. procumbens* provides experimental evidence for this traditional usage. A topical and oral administration of the extract to experimental animals resulted in hair-growth promotion.

This research is considered significant as it exemplifies how a pharmacological hypothesis derived from ethnomedicinal practice can be tested experimentally.

9. Ethnomedicinal Importance in Odisha

Odisha is known for its biodiversity and the associated traditional knowledge of herbs. Tribal people from different districts are highly dependent on local plants for their primary healthcare.

The ethnomedicinal potential of *T. procumbens* was found in Koraput district of Odisha. In the research conducted by Behera and Mahalik (2022), the authors studied ethnomedicinal plants used by tribal people of Kundra Block, Koraput district. The study findings highlighted that from 26 ethnomedicinal plants belonging to 17 families, *T. procumbens* was one of

the important species. Besides, the antibacterial activity of the plant species was evaluated by the researchers.

This study is interesting in terms that ethnobotanical research in tribal areas may generate knowledge about the pharmacological potential of a species. However, such data should be shared with local people appropriately and their contributions acknowledged.

10. Phytochemical Constituents

The medicinal properties of *T. procumbens* have been related to the wide variety of secondary metabolites found in different extracts and parts of this plant. The list of phytochemical groups reported in the literature includes flavonoids, alkaloids, tannins, saponins, terpenoids, carotenoids, phytosterols, fatty acids, phenolic compounds and essential oils. Thus, alkaloids, steroids, carotenoids, flavonoids, fatty acids, phytosterols, tannins and minerals were detected by Gubbiveeranna and Nagaraju (2016). Verma and Gupta (1988) studied the composition of the lipid part of *T. procumbens*. According to the results of a comprehensive systematic review, over 138 compounds were identified or isolated from *T. procumbens*, with flavonoids, terpenoids, saponins and essential oils being highlighted as key components (Ingole et al., 2022).

The latest research has revealed the presence of alkaloids, carbohydrates, polyphenols and tannins in the leaf and whole – plant extracts of *T. procumbens*, with the ethanolic fraction showing the highest antioxidant activity (Ahamad et al., 2023; Nandi et al., 2022).

Table 2. Major phytochemical groups and possible biological relevance

Phytochemical group	Possible biological relevance
Flavonoids	Antioxidant and anti-inflammatory activity
Tannins	Astringent and antimicrobial effects
Terpenoids	Anti-inflammatory and antimicrobial potential
Alkaloids	Diverse pharmacological activities

Phytochemical group	Possible biological relevance
Saponins	Antimicrobial and immunomodulatory potential
Carotenoids	Antioxidant activity
Phytosterols	Anti-inflammatory and metabolic effects
Essential oils	Antimicrobial and antioxidant potential
Phenolic compounds	Antioxidant and antimicrobial effects

The presence of these constituents provides a plausible biochemical basis for some traditional applications, although the presence of a compound group alone does not establish therapeutic efficacy.

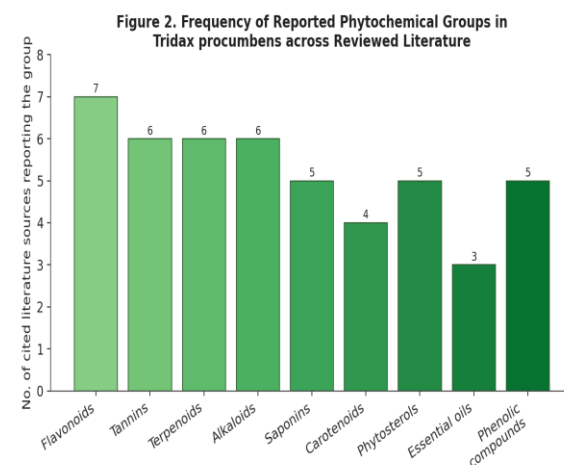


Figure 2. Relative frequency with which major phytochemical groups of *Tridax procumbens*.

11. Pharmacological Evidence Supporting Ethnomedicinal Uses

11.1 Wound-healing activity

Wound healing is, without a doubt, one of the most thoroughly studied functions of *T. procumbens*. Studies conducted on animals indicate that it plays a significant role in the healing of damaged tissues and improves the strength of stitched wounds (Udupa et al., 1991, 1995; Hemashenpagam et al., 2023).

11.2 Antimicrobial activity

Extracts obtained from *T. procumbens* have displayed antimicrobial activity against a range of

microorganisms in vitro. In the Koraput ethnomedicinal survey, petroleum ether and aqueous extracts were found to inhibit the growth of *Escherichia coli* and *Salmonella typhimurium* (Behera & Mahalik, 2022). Leaf extracts with ethanol as a solvent have also been found to possess inhibitory activity against bacteria such as *Staphylococcus aureus* and other pathogenic organisms (Shanmugapriya et al., 2017; Nandi et al., 2022).

The antimicrobial potential of these extracts may contribute to the ethnomedicinal use of *T. procumbens* for the treatment of wounds and infections.

11.3 Antioxidant activity

Flavonoids, phenolics, and other secondary metabolites present in the plant could be responsible for antioxidant activity. Most studies conducted on *T. procumbens* so far revealed a significant antioxidant potential among the biological activities evaluated (Gubbiveeranna & Nagaraju, 2016; Jangid et al., 2025). Ethanolic and methanolic extracts of the plant were found to have considerable free-radical scavenging activity when compared to ascorbic acid in DPPH and related radical scavenging assays (Ahmad et al., 2023; Shanmugapriya et al., 2017; Nandi et al., 2022).

11.4 Anti-inflammatory activity

Traditional use for inflammatory conditions has encouraged pharmacological investigations. Reviews have revealed anti-inflammatory activities of extracts and phytochemicals isolated from *T. procumbens* (Gubbiveeranna & Nagaraju, 2016). Bioassay-guided fractionation of standardized extracts was evaluated for cyclooxygenase-inhibitory activity, and both anti-inflammatory and antioxidant activities were reported in experimental models (Jachak et al., 2011).

11.5 Hair-growth activity

The hair-growth application of *T. procumbens* has received experimental support. Saraf et al. (1991) reported hair-growth-promoting activity of the ethanolic aerial-part extract in experimental animals.

11.6 Antiparasitic and antimalarial ethnomedicine

Ethnobotanical literature from Odisha and other regions notes the use of the plant species in traditional medicine for the treatment of malaria. An ethnobotanical survey on the tribes of Odisha mentions the use of a herbal decoction made from the leaves of *T. procumbens* and *Andrographis paniculata*

for the treatment of fever due to malaria, whereas another study notes similar traditional use of the plant in African communities. Early bioactivity tests of crude extracts have also shown potential pharmacological activities against parasitic and bacterial infections (Taddei & Rosas-Romero, 2000). Therefore, it must be noted that the evidence presented in the article refers to reports on the ethnobotanical use of the plant and not proof of its efficiency in the treatment of malaria. Thus, it is essential to conduct controlled pharmacological and clinical trials before considering any of the proposed treatments for malaria.

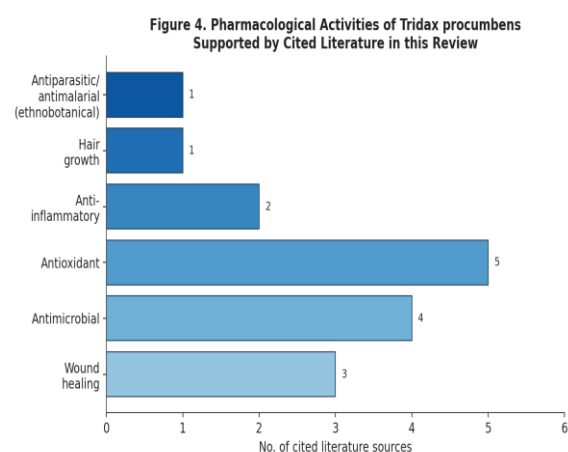


Figure 4. Number of literature sources cited in this review that report each major pharmacological activity associated with *Tridax procumbens*. Antioxidant and antimicrobial activities are the most frequently documented, followed by wound-healing effects.

12. Ethnomedicinal Significance

The importance of *T. procumbens* can be summarized under several major aspects:

12.1 Easily available medicinal resource

The plant grows abundantly in disturbed environments, agricultural fields and wastelands. Its accessibility makes it particularly useful to rural communities.

12.2 Low-cost traditional healthcare

Because it is commonly available, local populations can collect plant material without depending on expensive commercial medicines.

12.3 Traditional knowledge resource

The plant represents an example of indigenous knowledge concerning plant identification, preparation and application.

12.4 Potential pharmaceutical resource

Its diverse phytochemical profile and experimentally reported biological activities make it a potential source of bioactive compounds.

12.5 Relevance to tribal medicine

Evidence from Koraput demonstrates that *T. procumbens* is included within the medicinal plant repertoire of tribal communities in Odisha (Behera & Mahalik, 2022).

13. Discussion

The ethnomedicinal value of *Tridax procumbens* is supported by the combination of traditional usage, ethnobotanical studies, phytochemical analyses, and experimental pharmacology. The plant's healing properties are particularly notable, as they were demonstrated experimentally, and the mechanism of action was partially elucidated. The treatment of wounds with crushed leaves is a traditional practice that has been experimentally proven to affect wound healing in animals.

The study by Udupa et al. (1991) is especially noteworthy, as it demonstrates the effect of *Tridax procumbens* on lysyl oxidase and connective tissue, which could explain its healing properties.

The antimicrobial effects described in the Koraput study also contribute to the plant's medicinal reputation and explain its traditional use in treating wounds and infections. However, the antimicrobial potential only shows that the plant could be used to treat infections; topical usage of the plant would not be sufficient to combat a systemic infection.

The phytochemical content of the plant is another aspect that contributes to its medicinal value. Various bioactive compounds could participate in the pharmacological effects of the plant, either working together or independently. However, the specific compounds responsible for the effects described in traditional medicine and the exact mechanisms of action are yet to be elucidated. The variation in phytochemical content between the studies is also considerable, likely depending on the part of the plant and the solvent used in the extraction process (Ahmad et al., 2023; Ingole et al., 2022).

The main advantage of *T. procumbens* is its availability, which should be used in the development of medicinal preparations. However, the plant's medicinal potential should not be overtapped, and its use should be standardized to ensure that preparations are potent enough for use. Therefore, it is recommended that before developing commercial herbal preparations, experiments should be conducted to standardize the preparation process and ensure that the final product contains sufficient concentrations of bioactive compounds.

14. Limitations

There exist several limitations concerning the use of *T. procumbens* from the ethnomedicinal literature. Among these limitations are the following:

1. Community evidence is used instead of controlled trials for evaluating most traditional applications of *T. procumbens* ;
2. Most reports lack detail about plant parts and preparation methods used;
3. Dose rates of traditional preparations and the duration of treatment are not clear;
4. The potency of *T. procumbens* might vary depending on the period of harvesting, maturity of a plant, geographical location, and other factors;
5. Toxicological data is limited for *T. procumbens* ;
6. Pharmacological data mostly concerns in-vitro or animal studies;
7. Clinical studies concerning human patients are lacking for most traditional indications;
8. Proper ethical documentation and protection of intellectual property of indigenous people are required for ethnomedicinal studies.

The recent systematic review by Ingole et al. (2022) supports the concern about the toxicity knowledge about *T. procumbens* and the necessity of performing further pharmacological studies.

15. Future Prospects

Future research on *T. procumbens* should focus on the following areas:

15.1 Ethnobotanical documentation

Detailed field surveys should be conducted among tribal and rural communities to document:

- Local names;
- Plant parts used;
- Preparation methods;
- Dosage;

- Route of administration;
- Therapeutic indications;
- Seasonal collection practices; and
- Traditional knowledge associated with the plant.

15.2 Phytochemical standardization

Future studies should identify and quantify the major bioactive compounds using modern analytical techniques such as:

- HPLC,
- LC-MS/MS,
- GC-MS,
- FTIR, and
- NMR spectroscopy.

15.3 Molecular mechanism studies

The molecular pathways responsible for wound healing, antimicrobial, anti-inflammatory and antioxidant activities should be investigated.

15.4 Toxicological investigations

Acute, subacute and chronic toxicity studies are required to establish safety margins.

15.5 Clinical trials

Well-designed human clinical trials are essential before therapeutic claims can be translated into evidence-based medicine.

15.6 Conservation of traditional knowledge

Ethnomedicinal knowledge of tribal communities should be systematically documented while ensuring ethical participation, acknowledgement and benefit sharing.

16. Conclusion

Tridax procumbens L. (Asteraceae) is one of the ethnomedicinally rich plants that have been used in India for centuries. Despite its common perception as a weed, the species has significant therapeutic potential. Ethnomedicinal uses include treatment of wounds, arresting of bleeding, skin diseases, fevers, coughs, diarrhoea, dysentery, inflammation, liver problems and hair loss.

In particular, the ability of the plant to promote wound healing has been subject to extensive research. The ethnomedicinal use of the species to manage microbial infections has also been supported by preliminary antimicrobial studies (Udupa et al., 1991; Behera & Mahalik, 2022). Flavonoids, tannins, terpenoids, alkaloids, saponins, carotenoids, phytosterols, and other bioactive compounds might contribute to the pharmacological properties of *T. procumbens*.

However, ethnomedicinal uses of the species do not imply clinical efficacy. Further phytochemical, toxicological, molecular, and clinical studies are needed to isolate the therapeutically active compounds, elucidate their mechanisms of action, and demonstrate the efficacy and safety of the plant in targeted therapies.

The ethnomedicinal survey conducted among the tribal people of Koraput district, Odisha, India, revealed the traditional uses of *T. procumbens* as an indigenous remedy. Consequently, the phytomedicine has the potential to become an effective therapeutics agent for various ailments. Therefore, there is a need to document and scientifically validate traditional knowledge to discover and establish new pharmaceuticals.

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