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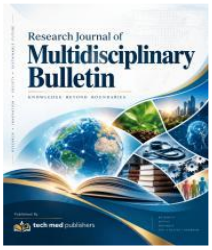

Review Article

TRICHOLEPIS GLABERRIMA DC: A COMPREHENSIVE REVIEW OF ITS ETHNOMEDICINAL USES, PHARMACOGNOSY, PHYTOCHEMISTRY, PHARMACOLOGICAL ACTIVITIES AND THERAPEUTIC POTENTIAL

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ABSTRACT

Tricholepis glaberrima DC. is an underexplored medicinal herb belonging to the family Asteraceae and is traditionally known as Brahmadandi. The plant is indigenous to India and occurs particularly in seasonally dry habitats. It has a history of use in Ayurveda and other traditional systems of medicine, where it has been associated with applications in sexual debility, nervous-system disorders, inflammatory conditions, hepatic disorders, skin ailments and urinary complaints. Modern pharmacological investigations have provided preliminary scientific support for several of these traditional claims. Phytochemical investigations have demonstrated the occurrence of sterols, triterpenoids, sesquiterpene lactones, flavonoids, saponins, glycosides and other secondary metabolites. Chemical studies have reported compounds such as betulin, spinasterol, stigmasterol, stigmast-7-enol, lupeol, cynaropicrin and 11,13-dihydrodesacylcynaropicrin. Pharmacological studies have demonstrated antioxidant, aphrodisiac, neuropharmacological, hepatoprotective and nephroprotective activities. Methanolic aerial-part extracts have shown antioxidant activity, while experimental studies have reported enhancement of sexual behavior and modulation of testicular antioxidant enzymes. Hepatoprotective investigations suggest that T. glaberrima may attenuate oxidative stress and inflammatory cytokines such as TNF-α and IL-6. Ethanolic bark extract has also demonstrated nephroprotective activity against gentamicin-induced renal injury. Its traditional association with urinary disorders and the presence of antioxidant and anti-inflammatory phytoconstituents suggest that the plant merits further investigation for renal and antiurolithiatic applications. However, the available literature remains fragmented, and there is a significant need for standardized extracts, quantitative phytochemical profiling, mechanistic investigations, toxicological evaluation and well-designed experimental studies. This review summarizes the available evidence concerning the botanical identity, ethnomedicinal significance, pharmacognostic characteristics, phytochemistry and pharmacological potential of T. glaberrima and identifies opportunities for future drug-development research.

Keywords: Tricholepis glaberrima, Brahmadandi, Asteraceae, phytochemistry, lupeol, cynaropicrin, antioxidant, hepatoprotective, nephroprotective, antiurolithiatic, medicinal plant.

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1. INTRODUCTION

Medicinal plants have historically provided an important foundation for traditional healthcare and continue to represent a valuable source of structurally diverse bioactive molecules. The family Asteraceae is particularly important in medicinal-plant research because of its abundance of flavonoids, phenolic compounds, terpenoids, sesquiterpene lactones, polyacetylenes and other specialized metabolites. Several members of this family have contributed important pharmacologically active compounds and continue to be investigated for their therapeutic potential.

Among the relatively less investigated members of Asteraceae is **Tricholepis glaberrima DC.**, commonly known as **Brahmadandi**. The species is accepted taxonomically by the Royal Botanic Gardens, Kew and is native to India, occurring primarily in seasonally dry tropical habitats (Kew Science, 2026). (Plants of the World Online)

Traditional literature associates T. glaberrima with several medicinal applications, particularly as a **nervine tonic and aphrodisiac**, while other reported uses include management of urinary, hepatic, neurological, inflammatory and dermatological conditions. The Indian medicinal-plant database IMPPAT records traditional therapeutic associations involving aphrodisiac use, male infertility, nervous-system disorders, skin diseases and urological conditions. (IMSC)

Scientific interest in T. glaberrima has increased because experimental studies have demonstrated multiple biological activities, including antioxidant, aphrodisiac, neuropharmacological, hepatoprotective and nephroprotective effects (Padashetty & Mishra, 2007; Naphade et al., 2009; Naik et al., 2015; Parmar et al., 2019).

Despite these promising findings, the species remains considerably less studied than extensively investigated medicinal plants such as Withania somnifera, Tinospora cordifolia and Curcuma longa. A systematic synthesis of available information is therefore valuable for identifying research gaps and developing future pharmacological and phytopharmaceutical investigations.

2. BOTANICAL CLASSIFICATION

Taxonomic rank	Classification
Kingdom	Plantae
Clade	Angiosperms
Order	Asterales
Family	Asteraceae (Compositae)
Genus	Tricholepis
Species	Tricholepis glaberrima DC.

Kew Science currently recognizes Tricholepis glaberrima DC. as an accepted species in Asteraceae. The species was first published by Augustin Pyramus de Candolle in Prodromus Systematis Naturalis Regni Vegetabilis. (Plants of the World Online)

Accepted scientific name

Tricholepis glaberrima DC.

Important synonym

Historical botanical literature has included names such as Carduus nitidus Wall. and Carduus indicus J.G. Klein ex Wall., although these are treated as heterotypic synonyms or invalidly published names in current taxonomic databases (Kew Science, 2026). (Plants of the World Online)

3. BOTANICAL DISTRIBUTION AND HABITAT

Tricholepis glaberrima is native to India. Flora of India records its distribution in **Madhya Pradesh, Rajasthan, Maharashtra, Karnataka and Tamil Nadu**. The species has also been documented from Karnataka and Maharashtra in regional floristic surveys. (Botanical Survey of India)

India Flora Online describes the plant as an herb occurring commonly on rocky ground, with flowering and fruiting reported during approximately September–November in the cited regional observations. (India Flora)

Flora of India describes the plant as an erect, rigid and essentially glabrous herb approximately 1 m tall, possessing slender ribbed branches and linear-oblong or lanceolate leaves. The capitula are relatively small, approximately 6–8 mm across, with subulate involucral bracts. (Botanical Survey of India)

The ecological distribution of the species is relevant to pharmacognostic standardization because environmental conditions, soil characteristics, rainfall, geographical origin and developmental stage can influence the production of secondary metabolites.

4. BOTANICAL DESCRIPTION

According to Flora of India, T. glaberrima is an erect, rigid, nearly glabrous herb approximately 1 m in height. The stem and branches are slender, angled and ribbed. Leaves are linear-oblong to lanceolate, sessile and may be entire or serrated. The capitula are small, measuring approximately 6–8 mm across. The involucral bracts are subulate, while the achenes are oblong and faintly ribbed. The pappus is relatively short and conspicuous (Botanical Survey of India, 2019). (Botanical Survey of India)

The species differs morphologically from other Tricholepis species and therefore requires proper botanical authentication before pharmacological investigation. This is particularly important because **Brahmadandi is a trade name that may refer to different medicinal plants**, creating a substantial possibility of substitution and adulteration (Padashetty & Mishra, 2007).

5. VERNACULAR AND COMMON NAMES

The plant is commonly known as:

- **Sanskrit:** Brahmadandi/Brahmadanda
- **English:** Smooth camel thistle
- **Ayurvedic medicinal name:** Brahmadandi
- **Family:** Asteraceae/Compositae

IMPPAT lists T. glaberrima under the common name **Smooth Camel Thistle** and recognizes its association with Ayurveda and Unani medicine. (IMSC)

6. ETHNOMEDICINAL AND TRADITIONAL USES

Traditional medicinal systems have attributed multiple therapeutic properties to T. glaberrima. The plant has particularly been associated with reproductive health and nervous-system support.

Padashetty and Mishra (2007) reported that aerial parts of T. glaberrima have traditionally been used as a **nervine tonic**, while an infusion was prescribed for **seminal debility and impotence**. (Taylor & Francis Online)

Traditional therapeutic associations documented in the IMPPAT database include:

- Aphrodisiac activity
- Male infertility

- Nervous-system disorders
- Skin disorders
- Urological disorders
- Vitiligo
- Local anti-infective applications

(IMPPAT, 2026). (IMSC)

The diversity of traditional applications suggests that the plant may contain multiple pharmacologically active constituents acting through different biological pathways.

7. PHARMACOGNOSTIC IMPORTANCE

Correct identification and standardization of medicinal plants are fundamental requirements for reproducible pharmacological research.

Padashetty and Mishra (2008) specifically investigated **phytochemical and pharmacognostical parameters for standardization of T. glaberrima**. Their work emphasized the need to distinguish genuine T. glaberrima from other materials marketed under the common name Brahmadandi. The study has been cited in pharmacognostic literature as a standardization reference for this plant.

A particularly important recent contribution was reported by Yeole et al. (2025), who investigated the **phytopharmacognostic profile of the stem** of T. glaberrima. The study included macroscopic and microscopic examination, physicochemical parameters, fluorescence analysis, phytochemical screening and quantitative assessment of phenolic and flavonoid constituents.

These investigations are important because variations in:

- plant part,
- geographical origin,
- harvesting season,
- drying method,
- extraction solvent,
- extraction technique and
- storage conditions

can substantially alter phytochemical composition and biological activity.

8. PROBLEM OF ADULTERATION AND SUBSTITUTION

One of the major challenges associated with T. glaberrima is the use of the name **Brahmadandi for multiple botanical sources**.

Padashetty and Mishra (2007) reported that commercially available Brahmadandi may include the roots of **Echinops echinatus** as well as the aerial parts of **Tricholepis glaberrima**. They developed an HPTLC method for estimation of **lupeol** to support quality control and authentication of commercial material.

The validated HPTLC method showed good precision, repeatability and recovery, demonstrating the potential of chromatographic fingerprinting for routine quality control.

Therefore, future pharmacological studies should report:

1. Botanical authentication.
2. Voucher specimen number.
3. Plant part used.
4. Geographical origin.
5. Extraction yield.
6. Phytochemical standardization.
7. Chromatographic fingerprint.
8. Marker-compound content.

9. PHYTOCHEMICAL CONSTITUENTS

Phytochemical investigations have identified several classes of secondary metabolites in T. glaberrima.

Reported constituents include:

- Sterols
- Triterpenoids
- Flavonoids
- Saponins
- Glycosides
- Phenolic compounds
- Sesquiterpene lactones
- Lupeol
- Betulin
- Spinasterol
- Stigmasterol
- Stigmast-7-enol
- Cynaropicrin
- 11,13-Dihydrodesacylcynaropicrin

Naik et al. (2015) reported the presence of spinasterol, quercetin, flavonoids, saponins, glycosides, steroids/triterpenoids, proteins and carbohydrates in extracts of T. glaberrima.

9.1 Betulin and phytosterols

An early chemical investigation by Chawla et al. (1976) demonstrated that the petroleum-ether extract yielded a **sterol fraction and the triterpenoid betulin**. Chromatographic separation of the sterol fraction indicated the presence of **spinasterol, stigmasterol and stigmast-7-enol**.

These findings are particularly significant because triterpenoids and phytosterols are widely investigated for antioxidant, anti-inflammatory, hepatoprotective, nephroprotective and metabolic activities.

9.2 Lupeol

Lupeol has been identified as an important marker constituent in Brahmadandi. Padashetty and Mishra (2007) developed an HPTLC method for quantifying lupeol in T. glaberrima and E. echinatus commercial materials. (ResearchGate)

The development of a validated HPTLC method provides an analytical basis for:

- authentication,
- standardization,
- batch-to-batch quality control,
- comparison of geographical samples and

- correlation of marker content with pharmacological activity.

9.3 Sesquiterpene lactones

Singhal et al. (1982) reported the isolation of **cynaropicrin and 11,13-dihydrodesacylcynaropicrin** from T. glaberrima. (ScienceDirect)

Cynaropicrin is a guaianolide-type sesquiterpene lactone found in several Asteraceae species. Its occurrence in T. glaberrima provides a potentially important chemotaxonomic and pharmacological feature. (MDPI)

Bhattacharyya et al. (1995) investigated cynaropicrin from T. glaberrima and reported its potential as an insect-feeding deterrent compound. (PubMed Central (PMC))

10. MAJOR PHYTOCHEMICAL CLASSES AND THEIR POSSIBLE SIGNIFICANCE

Phytochemical class	Reported examples	Possible pharmacological relevance
Triterpenoids	Lupeol, betulin	Anti-inflammatory, antioxidant, organ-protective potential
Phytosterols	Spinasterol, stigmasterol	Membrane effects, metabolic and anti-inflammatory potential
Sesquiterpene lactones	Cynaropicrin	Anti-inflammatory, cytotoxic and antifeedant potential
Flavonoids	Quercetin and related flavonoids	Antioxidant and anti-inflammatory potential
Saponins	Reported in extracts	Possible membrane, metabolic and immunological effects
Glycosides	Reported during screening	Diverse biological activities
Phenolics	Detected in extracts	Antioxidant potential

It should be emphasized that **the presence of a phytochemical class in preliminary screening does not establish a specific therapeutic effect**. Isolation, structural characterization and mechanism-oriented studies are required to establish causal relationships.

11. ANTIOXIDANT ACTIVITY

Oxidative stress is implicated in the pathogenesis of numerous disorders, including hepatic injury, renal injury, neurodegeneration, cardiovascular disease and reproductive dysfunction. Consequently, antioxidant activity is an important pharmacological characteristic of medicinal plants.

Naphade et al. (2009) evaluated aqueous, chloroform and methanolic extracts of the aerial parts of T. glaberrima using **ferric thiocyanate (FTC)** and **thiobarbituric acid (TBA)** methods. The methanolic extract demonstrated greater antioxidant activity than the chloroform and aqueous extracts, supporting the presence of antioxidant constituents in the plant. (ResearchGate)

The antioxidant activity may be related to flavonoids, phenolic constituents, triterpenoids and other redox-active compounds.

Importantly, antioxidant activity may also contribute indirectly to the plant's reported hepatoprotective, nephroprotective and reproductive effects.

12. NEUROPHARMACOLOGICAL ACTIVITY

The traditional use of T. glaberrima as a nervine tonic has stimulated investigations into its neuropharmacological properties.

Naphade et al. (2009) investigated methanolic, chloroform and aqueous extracts of the aerial parts in mice. Acute administration was associated with changes in **object-recognition performance, muscle relaxation, analgesic response and haloperidol-induced catalepsy**. The authors interpreted the results as suggesting nootropic potential and possible modulation of dopaminergic neurotransmission. (ResearchGate)

The findings are of interest because they provide preliminary experimental support for the traditional nervine application of the plant.

However, further studies are necessary to establish:

- specific neurotransmitter systems involved,
- receptor-level mechanisms,
- dose-response relationships,
- chronic effects,
- behavioral specificity and
- neurochemical changes.

13. APHRODISIAC AND REPRODUCTIVE ACTIVITY

The aphrodisiac potential of T. glaberrima is among its most extensively investigated pharmacological properties.

Padashetty and Mishra (2007) evaluated a methanolic extract of aerial parts in sexually active male rats. Their study investigated sexual behavior, testicular histology and antioxidant enzymes including **superoxide dismutase (SOD)** and **catalase**. (Taylor & Francis Online)

The findings provided experimental support for the traditional use of the plant in sexual debility and impotence.

The possible mechanisms may involve:

- improvement of antioxidant status,
- preservation of testicular tissue,
- modulation of reproductive function,
- enhancement of sexual motivation and
- improvement of physiological conditions associated with reproductive performance.

Nevertheless, the existing evidence is predominantly preclinical, and clinical efficacy in male sexual dysfunction has not been established.

14. HEPATOPROTECTIVE ACTIVITY

One of the important pharmacological investigations of T. glaberrima was conducted by Naik et al. (2015).

The investigators examined methanolic extract of T. glaberrima in experimental models of hepatotoxicity induced by **rifampicin** and **BCG/lipopolysaccharide**. Parameters included serum hepatic enzymes, total proteins, malondialdehyde (MDA), nitric oxide (NO), inflammatory cytokines and histopathological alterations. (ScienceDirect)

The study reported improvement in biochemical and histological parameters following treatment with the extract. Pretreatment was particularly effective and was associated with attenuation of oxidative and inflammatory changes.

The reported mechanism involved:

Oxidative/inflammatory insult
↓
↑ ROS and lipid peroxidation
↓
↑ MDA and NO
↓
↑ TNF-α and IL-6
↓
Hepatocellular injury

The extract was reported to reduce oxidative and inflammatory markers while improving antioxidant defense.

This provides a plausible pharmacological basis for traditional claims concerning hepatic disorders.

15. NEPHROPROTECTIVE ACTIVITY

The renal protective potential of T. glaberrima is especially relevant because traditional sources associate the plant with urinary and urological disorders.

Parmar et al. (2019) investigated an **ethanolic bark extract of T. glaberrima** against gentamicin-induced nephrotoxicity in rats. The study evaluated serum creatinine, blood urea, uric acid, liver enzymes, oxidative stress parameters and histopathological changes. (Juniper Publishers)

The extract was administered at **200 and 400 mg/kg**. The study reported improvement in biochemical and histopathological parameters, together with reduction of MDA and enhancement of GSH, SOD and catalase. (Juniper Publishers)

The findings suggest that the nephroprotective effect may involve attenuation of oxidative stress.

A simplified proposed pathway is:

Gentamicin
↓
ROS generation
↓
Lipid peroxidation
↓
Tubular cellular injury
↓
↑ Serum creatinine and BUN
T. glaberrima extract
↓
Antioxidant defense ↑
SOD ↑
Catalase ↑
GSH ↑
MDA ↓
↓
Renal tissue protection

This evidence is particularly important for future investigations into the plant's potential against renal disorders.

16. POTENTIAL ANTIUROLITHIATIC RELEVANCE

Although T. glaberrima has been traditionally associated with urinary disorders and experimental studies have demonstrated nephroprotective activity, **direct evidence specifically establishing antiurolithiatic efficacy remains limited** compared with the literature available for several other medicinal plants.

This distinction is important.

Nephroprotection against gentamicin-induced oxidative injury is **not equivalent to antiurolithiatic activity**. Urolithiasis involves processes including:

- urinary supersaturation,
- crystal nucleation,
- crystal growth,
- crystal aggregation,
- crystal retention,
- epithelial injury,
- oxidative stress and
- inflammatory responses.

Therefore, future studies should directly investigate T. glaberrima using:

In vitro models

- Calcium oxalate nucleation assay
- Calcium oxalate aggregation assay
- Crystal-growth inhibition
- Microscopic crystal morphology
- COM dissolution assays

In vivo models

- Ethylene glycol-induced urolithiasis
- Ethylene glycol + ammonium chloride model
- Hyperoxaluria models
- Urinary biochemical evaluation
- Renal crystal deposition
- Kidney histopathology

Biochemical parameters

- Urinary calcium
- Urinary oxalate
- Urinary phosphate
- Urinary uric acid

- Urinary citrate
- Serum creatinine
- BUN
- MDA
- GSH
- SOD
- Catalase

Therefore, the existing nephroprotective evidence provides a **scientific rationale for investigating antiurolithiatic activity**, but it should not be interpreted as proof of an antiurolithiatic effect.

17. ANTI-INFLAMMATORY POTENTIAL

The phytochemical profile of T. glaberrima provides a possible basis for anti-inflammatory activity.

Flavonoids, triterpenoids and sesquiterpene lactones are known to influence inflammatory pathways. In the hepatotoxicity study, treatment with T. glaberrima extract reduced inflammatory mediators including **TNF-α and IL-6**, suggesting that modulation of cytokine signaling may contribute to its organ-protective effects (Naik et al., 2015). However, dedicated investigations using established models of inflammation are still required to characterize:

- COX-1/COX-2 inhibition,
- 5-LOX modulation,
- NF-κB signaling,
- NLRP3 inflammasome activity,
- nitric oxide production and
- cytokine regulation.

18. ANTIMICROBIAL AND OTHER TRADITIONAL APPLICATIONS

Traditional databases and ethnomedicinal literature associate T. glaberrima with local anti-infective, skin and inflammatory applications. IMPPAT lists therapeutic associations with local anti-infective activity and skin disorders. (IMSC)

Nevertheless, compared with its aphrodisiac, antioxidant and hepatoprotective literature, **well-characterized antimicrobial studies of T. glaberrima are relatively scarce**.

Future studies should examine:

- Gram-positive bacteria,
- Gram-negative bacteria,
- fungal pathogens,
- dermatophytes,
- biofilm formation and
- minimum inhibitory concentrations.

19. POSSIBLE MECHANISMS OF PHARMACOLOGICAL ACTION

Based on available experimental evidence, a hypothetical integrated mechanism can be proposed.

19.1 Antioxidant pathway

Phytoconstituents
↓
Free-radical scavenging
↓
ROS ↓
↓
Lipid peroxidation ↓
↓
MDA ↓
↓
Cellular protection

19.2 Anti-inflammatory pathway

Phytoconstituents
↓
Inflammatory signaling modulation
↓
TNF-α ↓
IL-6 ↓
NO ↓
↓
Tissue inflammation ↓

19.3 Hepatoprotective pathway

Antioxidant + anti-inflammatory effects
↓
Hepatocyte protection
↓
AST/ALT/LDH normalization
↓
Improved hepatic architecture

19.4 Nephroprotective pathway

Antioxidant phytoconstituents
↓
ROS ↓
↓
MDA ↓
GSH/SOD/CAT ↑
↓
Tubular protection
↓
Creatinine/BUN ↓

19.5 Reproductive pathway

Antioxidant support
+
Testicular tissue protection
+
Possible endocrine/reproductive modulation
↓
Improved sexual behavior and reproductive parameters

These mechanisms remain partly hypothetical and should be experimentally validated.

20. PHARMACOLOGICAL ACTIVITIES REPORTED FOR T. GLABERRIMA

Pharmacological activity	Plant part/extract	Experimental evidence	Major observations
Antioxidant	Aerial parts; methanol, chloroform, aqueous	In vitro	Methanol extract showed stronger activity
Aphrodisiac	Aerial-part methanol extract	Male rats	Supportive effect on sexual behavior
Neuropharmacological	Aerial-part extracts	Mice	Nootropic and CNS-related effects
Hepatoprotective	Methanolic extract	Rats	Reduced oxidative/inflammatory hepatic injury
Nephroprotective	Bark ethanolic extract	Rats	Improved renal biochemical and histological parameters
Anti-inflammatory potential	Extracts	Experimental/indirect	Cytokine modulation reported
Antiurolithiatic potential	—	Insufficient direct evidence	Strong rationale for future investigation
Antimicrobial potential	Plant extracts/traditional use	Limited	Requires systematic validation

21. SAFETY AND TOXICOLOGICAL CONSIDERATIONS

The toxicological database for T. glaberrima remains limited.

Parmar et al. (2019) reported that acute administration of the ethanolic bark extract at doses up to **4000 mg/kg** did not produce mortality in their experimental rats, and lower doses were subsequently used for pharmacological evaluation. (Juniper Publishers)

However, absence of acute mortality does not establish complete safety.

Future safety studies should include:

- Acute toxicity
- 28-day repeated-dose toxicity
- 90-day toxicity
- Hematological evaluation
- Serum biochemical analysis
- Histopathology
- Genotoxicity
- Reproductive toxicity
- Developmental toxicity
- Drug-interaction studies

Special attention should be paid to sesquiterpene lactones because some compounds in this class may demonstrate concentration-dependent biological and cytotoxic effects.

22. QUALITY CONTROL AND STANDARDIZATION

Standardization is one of the most important requirements for the development of T. glaberrima-based herbal medicines.

Important quality-control parameters should include:

Macroscopic evaluation

- Size
- Shape
- Colour
- Odour
- Texture

Microscopic evaluation

- Epidermal characters
- Vascular bundles
- Trichomes
- Calcium oxalate crystals
- Secretory structures

Physicochemical parameters

- Moisture content
- Total ash
- Acid-insoluble ash
- Water-soluble extractive
- Alcohol-soluble extractive

Phytochemical standardization

- Total phenolic content
- Total flavonoid content
- Total triterpenoid content

Chromatographic markers

- Lupeol
- Betulin
- Spinasterol
- Cynaropicrin

HPTLC/HPLC/LC-MS-based fingerprinting should be incorporated into future pharmacological studies.

23. RECENT PHARMACOGNOSTIC RESEARCH

The 2025 study by Yeole et al. represents an important recent contribution to the standardization literature. The researchers investigated the stem of T. glaberrima, including pharmacognostic characteristics, physicochemical parameters, fluorescence analysis, phytochemical screening and quantitative phytochemical evaluation. (ResearchGate)

Such studies are important because earlier pharmacological work focused on aerial parts or other

plant materials. Comparative pharmacognostic characterization of **root, stem, leaves, flowers and whole aerial parts** could identify the most suitable plant part for therapeutic development.

24. RESEARCH GAPS

Despite considerable traditional importance, major gaps remain in the scientific literature.

24.1 Limited molecular studies

Most published studies have focused on crude extracts rather than molecular mechanisms.

24.2 Lack of standardized extracts

Different studies use different:

- plant parts,
- solvents,
- doses and
- extraction methods.

This makes comparison difficult.

24.3 Limited clinical evidence

There is currently insufficient clinical evidence to establish efficacy in humans.

24.4 Insufficient toxicity studies

Long-term toxicity and reproductive safety remain inadequately investigated.

24.5 Limited pharmacokinetic information

There is little information concerning:

- absorption,
- distribution,
- metabolism,
- bioavailability and
- elimination of major constituents.

24.6 Limited antiurolithiatic research

This represents a particularly interesting research opportunity given the traditional urinary applications and experimental nephroprotective evidence.

25. FUTURE RESEARCH PERSPECTIVES

Future research on T. glaberrima should move from preliminary screening toward **mechanism-based pharmacological investigation**.

Priority areas

1. Antiurolithiatic activity

Because of the traditional urinary applications and nephroprotective evidence, systematic investigation against calcium oxalate urolithiasis is warranted.

2. Molecular mechanism

Studies should investigate:

- NF-κB
- Nrf2/ARE
- MAPK
- COX-2
- 5-LOX
- NLRP3
- TGF-β
- AMPK

pathways.

3. Metabolomics

LC-MS/MS and NMR metabolomics could provide comprehensive chemical fingerprints.

4. Bioactive compound isolation

The biological activity of lupeol, betulin, spinasterol, cynaropicrin and related constituents should be investigated individually.

5. Molecular docking

Docking studies may help identify potential molecular targets, although computational findings should subsequently be experimentally validated.

6. Formulation development

Standardized extracts could potentially be developed into:

- tablets,
- capsules,
- phytosomes,
- nanoparticles,
- solid dispersions or
- other advanced herbal formulations.

7. Pharmacokinetic studies

Bioavailability and metabolism studies are required to determine whether active constituents can reach pharmacologically relevant concentrations.

26. SPECIAL POTENTIAL OF T. GLABERRIMA IN RENAL RESEARCH

Among the various therapeutic applications of T. glaberrima, its potential in renal research deserves particular attention.

The following evidence forms a logical research basis:

Traditional use
↓
Urinary/urological applications
↓
Phytochemistry
Flavonoids + phenolics + triterpenoids + sterols
↓
Antioxidant activity
ROS ↓
↓
Nephroprotective activity
MDA ↓; GSH/SOD/CAT ↑
↓
Reduced renal injury
↓
Research hypothesis

T. glaberrima may possess protective and/or antiurolithiatic effects through antioxidant, anti-

inflammatory, diuretic and crystal-modulating mechanisms.

However, this remains a **research hypothesis**, not an established therapeutic claim.

27. CONCLUSION

Tricholepis glaberrima DC. is an important but comparatively underexplored medicinal plant belonging to the Asteraceae family. Traditionally known as Brahmadandi, the plant has been used in Indian systems of medicine particularly for sexual debility and as a nervine tonic, while ethnomedicinal databases also associate it with neurological, hepatic, dermatological and urinary disorders.

Pharmacognostic investigations have emphasized the importance of proper botanical authentication because different species are commercially sold under the name Brahmadandi. Chemical investigations have identified several biologically interesting constituents, including **lupeol, betulin, spinasterol, stigmasterol, stigmast-7-enol, cynaropicrin and 11,13-dihydrodesacyl cynaropicrin**.

Experimental evidence supports several biological activities, particularly **antioxidant, aphrodisiac, neuropharmacological, hepatoprotective and nephroprotective effects**. The hepatoprotective and nephroprotective activities appear to involve attenuation of oxidative stress and inflammatory responses. The antioxidant activity of the plant may provide a common mechanistic basis linking several of its pharmacological effects.

Importantly, the plant's traditional association with urinary disorders combined with experimental nephroprotection provides a compelling rationale for systematic investigation of its **antiurolithiatic potential**. Nevertheless, direct evidence against urinary stone formation remains inadequate and should be distinguished from general nephroprotective activity.

Future investigations should therefore focus on standardized extracts, marker-based quality control, advanced chromatographic profiling, isolation of bioactive compounds, molecular mechanisms, pharmacokinetics, toxicity and validated antiurolithiatic models. With appropriate scientific standardization and mechanistic validation, T. glaberrima could emerge as a promising candidate for development of novel phytopharmaceutical interventions.

REFERENCES

[1]. Botanical Survey of India. (2019). Flora of India: Asteraceae. Botanical Survey of India, Ministry of Environment, Forest and Climate Change, Government of India.

[2]. Bhattacharyya, P. R., Barua, N. C., & Ghosh, A. C. (1995). Cynaropicrin from Tricholepis glaberrima: A potential insect feeding deterrent compound. Industrial Crops and Products, 4, 291–294.

[3]. Chawla, A. S., Kapoor, V. K., Sangal, P. K., Gupta, A. K., & Evans, F. J. (1976). Chemical constituents of Tricholepis glaberrima. Planta Medica, 30(2), 151–153.

[4]. Kew Science. (2026). Tricholepis glaberrima DC. Plants of the World Online. Royal Botanic Gardens, Kew.

[5]. Kiranmai, G., Veena, R., & Afreen, S. (2017). Pharmacological screening of antidepressant activity of plant Tricholepis glaberrima. European Journal of Biomedical and Pharmaceutical Sciences, 4(12), 634–639.

[6]. Manerikar, S. V., & Kulkarni, A. B. (1978). Chemical investigation of Tricholepis glaberrima. Indian Journal of Chemistry, 16, 439–440.

[7]. Naik, S. R., et al. (2015). Ameliorative effects of Tricholepis glaberrima in experimentally induced hepatic damage in rats: Modulation of cytokines functions. Journal of Ethnopharmacology, 160, 164–172.

[8]. Naphade, S. S., Khadabadi, S. S., Deore, S. L., Jagtap, N. S., & Hadke, S. P. (2009). Antioxidant activity of different extracts of plant Tricholepis glaberrima DC (Asteraceae). International Journal of PharmTech Research, 1(3), 502–505.

[9]. Naphade, S. S., Khadabadi, S. S., Farooqui, I. A., Deore, S. L., & Hadke, S. P. (2009). Neuropharmacological profile of Tricholepis glaberrima extract in mice. Pharmacologyonline, 2, 140–150.

[10]. Padashetty, S. A., & Mishra, S. H. (2007). An HPTLC method for the evaluation of two medicinal plants commercially available in the Indian market under the common trade name Brahmadandi. Chromatographia, 66, 447–449.

[11]. Padashetty, S. A., & Mishra, S. H. (2007). Aphrodisiac studies of Tricholepis glaberrima with supportive action from antioxidant enzymes. Pharmaceutical Biology, 45(7), 580–586.

[12]. Padashetty, S. A., & Mishra, S. H. (2008). Phytochemical and pharmacognostical parameters for standardization of Tricholepis glaberrima: A medicinal herb. Journal of Medicinal and Aromatic Plant Sciences, 30(4), 381–388.

[13]. Parmar, M. Y., Sindhuja, S., Mounika, B., & Pore, D. (2019). Nephroprotective potential of ethanolic extract of barks of Tricholepis glaberrima against gentamicin-induced nephrotoxicity. Journal of Pharmacology & Clinical Research, 7(1), 555708.

[14]. Priyadarshi, A., Singh, S., & Kumar, S. (2018). Review on Ayurvedic, pharmacognostical, phytochemical and pharmacological insights of Brahmadandi (Tricholepis glaberrima DC). International Journal of Research and Analytical Reviews, 5(2), 1738–1745.

[15]. Yeole, K. R., Wadekar, R. R., & Patil, K. S. (2025). Exploring the phytopharmacognostic profile of Tricholepis glaberrima DC (Brahmadandi) stem. Journal of Natural Remedies, 25(6), 1347–1354.

[16]. Shahbaz, A., et al. (2022). Antioxidant, anticancer, and PXR-dependent CYP3A4 attributes of

Schweinfurthia papilionacea, Tricholepis glaberrima DC. and Viola stocksii Boiss. Oxidative Medicine and Cellular Longevity.
[17]. Singhal, A. K., et al. (1982). Guaianolide sesquiterpene lactones from Tricholepis glaberrima. Phytochemistry.
[18]. Khare, C. P. (2007). Indian medicinal plants: An illustrated dictionary. Springer.
[19]. Kirtikar, K. R., & Basu, B. D. (1975). Indian medicinal plants (Vol. 2). Periodical Experts.
[20]. Nadkarni, A. K. (1976). Indian Materia Medica (Vol. 1). Popular Prakashan.
[21]. World Health Organization. (1998). Quality control methods for medicinal plant materials. WHO.
[22]. Bachman, S. P., Brown, M. J. M., Leão, T. C. C., Lughadha, E. N., & Walker, B. E. (2024). Angiosperm extinction risk predictions for the world's flowering plants. New Phytologist. Kew reports T. glaberrima as having a predicted threatened status, with confident prediction in its AERP resource.