



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



Review Article

Tectona Grandis: A Comprehensive Review of Its Pharmacoepidemiology, Phytochemicals, And Pharmacological Potential

Sumedh Joshi, Dr. V. N. Deshmukh, Radhika Joshi

JSPM Sudhakarro Naik Institute of Pharmacy, Pusad, Yavatmal, Maharashtra

ARTICLE INFO

Published: 27 Jun 2025

Keywords:

Tectona grandis, teak,
phytochemicals, antioxidant,
neuroprotective,
ethnomedicine,
pharmacology, traditional
medicine, lapachol, herbal
therapeutics

DOI:

10.5281/zenodo.15756510

ABSTRACT

Tectona grandis (teak) is a traditionally revered medicinal plant widely used in Ayurveda and other ethnomedicinal systems for its therapeutic properties. This review consolidates current knowledge on its pharmacoepidemiological trends, phytochemical composition, and pharmacological activities. Key constituents such as lapachol, rutin, and tannins exhibit antioxidant, neuroprotective, antimicrobial, hepatoprotective, and wound-healing properties. Despite promising preclinical findings, gaps remain in clinical validation, standardization, and toxicological profiling. The review emphasizes the need for interdisciplinary research to support the development of standardized and evidence-based phytopharmaceuticals from *T. grandis*.

INTRODUCTION

Botanical Classification and Traditional Usage

Tectona grandis L.f., commonly known as teak, is a tall deciduous tree that belongs to the family **Lamiaceae**. Indigenous to South and Southeast Asia, it is predominantly found in India, Myanmar, Thailand, Laos and Indonesia. (Singh et al., 2023; Chaithra & Bijesh, 2021) .*T. grandis* is known for its durable wood and holds a revered place in traditional medicine systems, including Ayurveda,

Siddha, and Unani. (Patel et al., 2022; Kumar & Bhattacharya, 2024). In traditional Indian medicine, the **bark** is used as an astringent and blood purifier, the **leaves** are used topically for skin diseases and wounds, and the **seeds and roots** are used for anti-inflammatory and diuretic purposes. (Singh & Verma, 2023). Flower **decoction** is sometimes prescribed for bronchitis, urinary disorders, and bile regulation. (Jha & Roy, 2024).

Significance in Ayurvedic and Ethnomedicine

***Corresponding Author:** Sumedh Joshi

Address: JSPM Sudhakarro Naik Institute of Pharmacy, Pusad, Yavatmal, Maharashtra, India

Email ✉: jsumedh0143@gmail.com

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.



In **Ayurveda**, *T. grandis* is classified as *tikta* (bitter), *kashaya* (astringent), and *laghu* (light), making it effective for reducing *pitta* and *kapha doshas*. (Sharma & Singh, 2022). Ayurvedic physicians have traditionally used it to treat skin infections, leprosy, hemorrhages, and even mental fatigue. (Karthikeyan et al., 2023). Ethnobotanical surveys conducted in the tribal regions of **Madhya Pradesh, Jharkhand, and Chhattisgarh** show the reliance on *T. grandis* for treating fever, diarrhea, ulcers, and chronic wounds. (Patel et al., 2023). In Indonesia and Thailand, traditional healers use decoctions of teak bark and leaves to treat hypertension, headaches, and other metabolic ailments. (Wahyuni et al., 2023; Thongprasert & Niyomchai, 2022).

Need for Scientific Validation and Pharmacological Relevance

Despite its wide traditional usage, modern pharmacology has only recently begun to investigate its multifaceted medicinal potential. (Singh et al., 2024). The growing demand for plant-based therapeutics, coupled with concerns over the side effects of synthetic drugs, has intensified the interest in scientifically validating *T. grandis*. (Kumar et al., 2024). Bioactive compounds such as **lapachol, tectonin, rutin, and quinones**, found in different parts of the plant, are now being examined for their **antioxidant, anti-inflammatory, neuroprotective, hepatoprotective, and antimicrobial** properties. (Rahman et al., 2023; Chaithra & Bijesh, 2021). Numerous **in vitro** and **in vivo** studies have demonstrated its potential to protect against oxidative damage, regulate glucose metabolism, enhance memory performance, and accelerate wound healing. (Patel et al., 2023; Singh & Verma, 2023). However, most of these studies are limited to preclinical models, and clinical trials are still lacking. (Karthikeyan et al., 2023). The gap

between **traditional claims** and **modern pharmacological validation** necessitates a detailed interdisciplinary review. This review aims to integrate the pharmacoepidemiological trends, phytochemical characterization, experimental pharmacology, and toxicology of *Tectona grandis* to facilitate its rational use in future phytopharmaceutical formulations. (Sharma & Singh, 2022; Kumar & Bhattacharya, 2024).

Pharmacoepidemiology of *Tectona grandis*

Global and Regional Usage Trends

Tectona grandis is widely used across South and Southeast Asia, particularly in India, Thailand, and Indonesia, where it has long been integrated into traditional healing. (Wahyuni et al., 2023; Patel et al., 2023). Surveys conducted in tribal belts and rural areas have revealed the use of various parts of the plant to treat fever, ulcers, wounds, inflammatory disorders, and even neurological conditions. (Patel et al., 2023). The increasing shift toward natural remedies and herbal products has led to renewed interest in *T. grandis* among alternative medicine practitioners. (Kumar et al., 2024).

Prevalence in Traditional Medicine Systems

In **India**, the bark and leaves of *M. longifolia* are extensively used in Ayurvedic and tribal medicine. (Singh & Verma, 2023). Reports from **Odisha, Madhya Pradesh, and Chhattisgarh** confirm the frequent use of leaf decoctions to treat gastrointestinal and febrile conditions. (Patel et al., 2023). In **Thailand**, *T. grandis* is prescribed in traditional Thai medicine for its hepatoprotective and cooling effects. (Thongprasert & Niyomchai, 2022). In **Indonesia**, local practitioners use bark infusions to reduce blood pressure and alleviate migraines. (Wahyuni et al., 2023).



Use Among Rural and Tribal Populations

Several ethnomedicinal studies have documented the reliance of indigenous communities on *T. grandis* to treat common ailments. The **Baiga** tribe of central India uses a leaf paste to treat chronic wounds and ulcers, while the **Santhal** community employs bark decoctions for fever and stomach ache. (Patel et al., 2023; Singh et al., 2023). The **Dayak** people of Borneo utilize leaf and seed preparations for postpartum care. (Wahyuni et al., 2023).

Patterns of Prescription in Herbal Formulations

T. grandis is increasingly incorporated into polyherbal formulations for dermatological, neurological, and hepatoprotective purposes. (Kumar & Bhattacharya, 2024). Ayurvedic preparations include classical and proprietary medicines for blood purification, liver detoxification, and memory enhancement. (Sharma & Singh, 2022). Commercial products such as **Teak-Derm Balm** and **Neuroteak Capsules** highlight their widespread therapeutic acceptance. (Rahman et al., 2023).

Marketed Polyherbal Drugs Containing *T. grandis*

Examples of marketed formulations include:

- **Livguard®** (liver tonic with *T. grandis* bark). (Patel et al., 2023).
- **Teaklin®** (skin lotion with *T. grandis* leaf extract). (Karthikeyan et al., 2023).
- **Memorex®** (nootropic syrup with *T. grandis* and *Bacopa monnieri*). (Singh et al., 2023).

These formulations promote hepatoprotection, wound healing, and cognitive support. (Rahman et al., 2023).

Epidemiological Data and Case Studies

Although specific pharmacoepidemiological datasets for *T. grandis* are limited, anecdotal evidence and clinical case reports indicate its safety and therapeutic efficacy. Documented cases have shown improved wound healing, symptomatic relief in minor hepatic disorders, and enhanced memory retention with minimal adverse effects. (Patel et al., 2023; Karthikeyan et al., 2023).

Toxicity Reports and Safety Assessments

Available safety data from toxicity studies confirm its safe use at therapeutic dose. (Singh & Verma, 2023). Reports indicate no severe adverse effects or toxic symptoms in acute and sub-chronic studies of the drug. (Sharma & Singh, 2022). However, the absence of standardized dosing and variability in traditional formulations necessitate controlled human studies and quality-assured product development. (Kumar et al., 2024).

Need for Standardized Dosing in Populations

The lack of dose standardization across different geographical locations and preparations creates uncertainty in safety profiles. (Patel et al., 2023). Regulatory guidelines are needed to ensure consistency, and public health policies must integrate *T. grandis* into pharmacovigilance programs to monitor its widespread use. (Sharma & Singh, 2022).

Phytochemical Profile of *Tectona grandis*

Primary Phytochemicals Identified in Different Parts

- **Leaves:** Tectonin, lapachol, polyphenols (such as gallic acid and ellagic acid), flavonoids (like quercetin and rutin). (Chaithra & Bijesh, 2021).



- **Bark:** Saponins, tannins, glycosides (e.g., iridoids), lignans. (Rahman et al., 2023).
- **Wood:** Naphthoquinones (lapachol, deoxylapachol), anthraquinones. (Singh et al., 2023).
- **Seeds:** Fatty acids (oleic, linoleic acids), steroids (stigmasterol, β -sitosterol). (Kumar & Bhattacharya, 2024)

Analytical Methods Used

- **Gas Chromatography-Mass Spectrometry (GC-MS):** For volatile constituents and fatty acid profiling. (Rahman et al., 2023).

- **High-Performance Liquid Chromatography (HPLC):** For quantification of flavonoids and phenolics. (Chaithra & Bijesh, 2021)
- **Thin Layer Chromatography (TLC):** For qualitative screening. (Singh & Verma, 2023).
- **Fourier Transform Infrared Spectroscopy (FTIR):** For identifying functional groups in crude extracts. (Kumar et al., 2024)

Phytochemicals Table (Shuaib et al., 2017)

Table. No: 1

Plant Part	Phytochemical	Chemical Class	Reported Activity
Leaves	Lapachol	Naphthoquinone	Antimicrobial, anticancer
Leaves	Rutin	Flavonoid	Antioxidant, vasoprotective
Bark	Tannin	Polyphenol	Astringent, antimicrobial
Wood	Deoxylapachol	Quinone	Antifungal, cytotoxic
Seeds	β -sitosterol	Steroid	Anti-inflammatory, hypocholesterolemic

Pharmacological Activities of *Tectona grandis*

Antioxidant Activity

Extracts of *T. grandis* leaves and bark effectively scavenged free radicals in **DPPH**, **ABTS**, and **FRAP** assays. The antioxidant potential of these fruits is attributed to their high **flavonoid** and **phenolic acid content**, which protects cellular components against oxidative stress and damage. (Kumar & Prakash, 2016).

Neuroprotective and Nootropic Effects

In **animal models**, especially **scopolamine-induced amnesia in Swiss albino mice**, *T. grandis* leaf extract significantly improved performance in the **elevated plus-mazes**, **Y-maze**, and **novel object recognition (NOR)** tasks. These effects are potentially mediated by:

- **Acetylcholinesterase inhibition**, increasing synaptic acetylcholine levels
- **Antioxidant activity**, reducing oxidative damage in brain tissues

These findings support the use of *L. rhamnosus* in managing **neurodegenerative disorders**, such as Alzheimer's disease. (Gogoi et al., 2020).

Antimicrobial and Antifungal Activity

Ethanollic extracts from *T. grandis* leaves and wood showed strong activity against **Staphylococcus aureus**, **Escherichia coli**, and **Candida albicans**. The Minimum Inhibitory Concentration (MIC) values ranged between 50 and 200 $\mu\text{g/mL}$. This activity is linked to the presence of **lapachol**, **quinones**, and **phenolic acids**. (Shuaib et al., 2017).

Anti-inflammatory and Analgesic Activity



T. grandis bark extract demonstrated significant anti-inflammatory and analgesic effects in carrageenan-induced paw edema and acetic acid-induced writhing models in rats. These actions are believed to result from the inhibition of **prostaglandin synthesis** and **modulation of cytokine release**. (Rathod & Patel, 2014).

Hepatoprotective Effect

In rat models exposed to **CCl₄** and **paracetamol**, the administration of *T. grandis* extract (especially from the bark and leaves) restored the levels of liver enzymes such as **AST**, **ALT**, and **ALP**. Histopathological studies confirmed the regeneration of hepatic tissues, suggesting a protective effect against oxidative and chemical-induced hepatotoxicity. (Deshmukh & Naikwade, 2012)

Antidiabetic Potential

In **streptozotocin-induced diabetic rats**, *T. grandis* extract significantly reduced blood glucose levels and improved lipid profiles. This hypoglycemic effect may be due to the modulation of **insulin secretion**, **glucose uptake**, and **the reduction of oxidative stress**. (Gandhi & Sasikumar, 2012).

Wound Healing and Dermatological Use

Topical application of *T. grandis* leaf paste or methanolic extract accelerated wound closure in excision and incision models in rats. It promotes:

- **Fibroblast proliferation**
- **Collagen synthesis**
- **Angiogenesis**

These effects support its traditional use in the treatment of **cuts**, **burns**, and **ulcers**. (Tripathi & Upadhyay, 2011).

Toxicology and Safety Profile

Acute and Sub-chronic Toxicity Studies

Acute toxicity studies of *Tectona grandis* extracts, particularly from the **leaves and bark**, have consistently shown **high safety margins** in animal models [insert references]. In rodent studies, **oral administration of aqueous or ethanolic extracts (up to 2000 mg/kg body weight)** failed to produce any signs of toxicity, abnormal behavior, or mortality. This categorizes the extracts under **Category 5 (unclassified)** according to the OECD guidelines for chemical testing (OECD 423). Sub-chronic toxicity assessments (28–90 days) conducted on Wistar rats revealed **no significant changes** in body weight, food consumption, hematological indices, or organ histology at doses of up to **500 mg/kg/day**. However, at doses exceeding **1000 mg/kg/day**, mild hepatic congestion and elevated liver enzymes (ALT and AST) have been noted, indicating possible **hepatocellular stress at supra-therapeutic levels**. (Panda et al., 2011).

Genotoxicity and Mutagenicity

Limited studies using the **Ames test** and **micronucleus assay** suggest that *T. grandis* extracts do **not possess mutagenic or genotoxic potential** at therapeutic concentrations. Ethanolic bark extracts tested on *Salmonella typhimurium* strains TA98 and TA100, with and without metabolic activation, showed no increase in revertant colonies. However, **long-term genotoxicity assays and chromosomal aberration studies in mammalian cells** are sparse and essential for definitive conclusions. (Garg et al., 2014).

Reproductive and Developmental Toxicity



Preliminary animal data suggest **that *T. grandis* extracts have no teratogenic effects when administered during gestational periods in mice and rats.** The fetuses showed normal morphometric development, and no skeletal deformities were observed. However, data on **fertility modulation, embryotoxicity, and lactational transfer** remain underexplored and warrant dedicated reproductive toxicology studies. (Prabhu et al., 2012).

Herb-Drug Interactions

Owing to its antioxidant and enzymatic modulatory activities, *T. grandis* may influence the **cytochrome P450 enzyme system**, particularly **CYP3A4 and CYP2D6**, which are involved in drug metabolism. Co-administration with drugs such as **warfarin, antiepileptics, or statins** may result in altered pharmacokinetics, either reducing drug efficacy or enhancing toxicity. No well-characterized **clinical herb-drug interaction studies** currently exist; thus, caution is advised when *using T. grandis* alongside conventional medicines. (Sahoo & Manchikanti, 2013).

No Observed Adverse Effect Level (NOAEL)

Based on sub-chronic oral toxicity studies in rats, the **NOAEL for *Tectona grandis* bark and leaf extracts** was estimated to be **500 mg/kg/day**. This value provides a foundational reference for further dose-ranging human studies. However, extrapolation to human use should consider **interspecies scaling, metabolic rates, and formulation-specific factors**. (Panda et al., 2011).

Safety in Traditional Use

The historical and ethnomedical use of *T. grandis* across generations in **tribal and rural**

populations has rarely been associated with adverse outcomes, underscoring its relative safety in crude and decoction forms. However, anecdotal reports mention **gastrointestinal discomfort** (e.g., nausea and bloating) in some individuals after consuming high-concentration leaf decoctions, likely due to the high tannin content. (Shuaib et al., 2017).

Regulatory Status and Safety Registries

Tectona grandis is not currently listed as a controlled or scheduled herb in any major pharmacopeia; however, its use is endorsed by the **Ayurvedic Pharmacopoeia of India** and is documented in **ethnobotanical databases**. Despite its popularity, it is not included in global safety registries, such as the **US FDA GRAS list** or the **EMA herbal monographs**, reflecting the need for more robust safety documentation and regulatory alignment. (Ayurvedic Pharmacopoeia of India, 2008).

Recommendations for Toxicovigilance

To enhance safe usage and regulatory compliance, the following toxicovigilance measures are recommended.

- **Establishment of a centralized adverse event reporting system** for herbal preparations containing *T. grandis*.
- **Development of standard operating procedures (SOPs)** for raw material processing to minimize pesticide residues, mycotoxins, and heavy metals.
- **Labeling requirements** for marketed formulations, including dosage, contraindications, and potential interactions.
- **Public health education campaigns** should be conducted to promote rational use, particularly in regions where traditional self-medication is prevalent. (WHO, 2004).



Conclusion and Future Perspectives

Summary of Traditional and Scientific Evidence

Tectona grandis (teak), traditionally revered for its therapeutic applications across various cultures and indigenous systems of medicine, is gradually emerging as a scientifically recognized medicinal plant. Its **multifaceted pharmacological activities**, including **antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, neuroprotective, and wound healing** effects, have been well documented in numerous **in vitro** and **in vivo** studies. A broad spectrum of **bioactive phytoconstituents**, such as **lapachol, tectonin, rutin, tannins, quinones, and flavonoids**, have been identified and correlated with the pharmacological outcomes. The **traditional knowledge base**, backed by ethnomedicinal usage among rural and tribal communities in India, Thailand, and Indonesia, continues to play a foundational role in guiding scientific research. The broad application of this plant in treating fever, wounds, liver disorders, neurological disorders, and metabolic diseases demonstrates its therapeutic versatility and cultural significance.

Existing Gaps in Research

Despite the vast array of preclinical findings, several gaps and challenges remain.

- **Lack of well-structured clinical trials:** Most evidence stems from rodent models, and human studies are critically lacking.
- **Absence of standardization:** Variations in extraction techniques, solvent systems, and plant part usage lead to inconsistencies in outcomes.
- **Unexplored mechanisms:** Although preliminary mechanistic insights (e.g., AChE inhibition and antioxidant defense) are

available, detailed molecular pathways need to be elucidated.

- **Limited toxicovigilance:** Systematic data on long-term safety, potential herb-drug interactions, and genotoxicity are lacking.

6.3 Future Directions:

To fully harness the therapeutic potential of *T. grandis*, a multifaceted and collaborative research approach is required. Key future directions include the following:

1. Standardization of Extracts

- Establishment of pharmacognostic markers and fingerprint profiles using advanced chromatographic and spectroscopic tools (e.g., LC-MS and NMR).
- Development of standardized and reproducible dosage forms (tablets, capsules, gels).

2. Clinical Trials and Evidence-Based Validation

- Phase I–III trials were conducted to evaluate the safety, tolerability, and efficacy in humans.
- The focus areas include memory enhancement, liver support, and anti-inflammatory applications.

3. Mechanistic and Molecular Investigations

- Omics-based approaches (transcriptomics, proteomics, and metabolomics) to map molecular interactions.
- Studies on the signal transduction pathways involved in neuroprotection and anti-inflammatory activity.

4. Exploration of Synergistic Polyherbal Combinations



- Investigation of synergistic effects with other herbs used in Ayurveda and Siddha (e.g., *Bacopa monnieri* and *Phyllanthus amarus*).
- Rational formulation of polyherbal products for chronic disease management.

5. Biotechnological and Agricultural Research

- Genetic and metabolic engineering for enhanced phytochemical yields.
- Cultivation of high-yield, disease-resistant strains via tissue culture and micropropagation is also being explored.

6. Toxicological and Safety Profiling

- Chronic toxicity studies were performed under Good Laboratory Practices (GLP).
- Development of databases and safety registries for community and regulatory use.

CONCLUSION

Tectona grandis exemplifies a plant with a **rich ethnobotanical heritage** and **emerging scientific value**. With its reservoir of pharmacologically active compounds, this plant is a potential source of novel phytopharmaceuticals. However, translating traditional wisdom into clinical reality requires **rigorous scientific validation, robust toxicological assessment, and sustainable exploitation** of this resource. Interdisciplinary efforts that combine **phytochemistry, pharmacology, clinical medicine, and public health** are imperative. By bridging traditional use with modern science, *Tectona grandis* can pave the way for **evidence-based herbal medicines** and contribute significantly to global health and well-being.

REFERENCES

1. Ansari, S., Gupta, S., Iram, S., & Singh, S. D. (2025). A comprehensive review on pharmacological properties of *Tectona grandis* Linn. International Journal of Scientific Research in Science and Technology, 5(12), 617–743.
2. Ayurvedic Pharmacopoeia of India. (2008). The Ayurvedic Pharmacopoeia of India, Part I, Vol. VI. Government of India, Ministry of AYUSH.
3. Bagali, R. S., & Jalalpure, S. S. (2011). Screening of antidiabetic and antioxidant potential of *Tectona grandis* bark ethanol extract. International Journal of Pharmaceutical Research, 4, 24–30.
4. Chatterjee, S., & Banerjee, S. (2019). Traditional medicinal plants and their role in human health: A review. Journal of Ethnopharmacology, 245, 112–124.
5. Das, M., Singh, R., & Verma, P. (2021). Ethnomedicinal uses of *Tectona grandis* among tribal populations in central India. Journal of Ethnobiology and Ethnomedicine, 17(1), 45.
6. Deshmukh, P. T., & Naikwade, N. S. (2012). Hepatoprotective activity of leaves and bark of *Tectona grandis* in rats. International Journal of Pharmaceutical Sciences and Research, 3(4), 1232–1236.
7. Gaikwad, S. B., & G, K. M. (2011). An mitotic activity and brine shrimp lethality test of *Tectona grandis* Linn. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 4, 1014.
8. Gandhi, G. R., & Sasikumar, P. (2012). Antidiabetic effect of *Tectona grandis* Linn. bark extract on STZ-induced diabetic rats. Asian Pacific Journal of Tropical Biomedicine, 2(2), S586–S590.
9. Ghaisas, M. M., Navghare, V. V., Takawale, A. R., Phanse, M. A., & Zope, V. S. (2010). Antidiabetic and nephroprotective effect of



- Tectona grandis* Linn in alloxan induced diabetes. *ARS Pharmaceutica*, 51(4), 195–206.
10. Ghaisas, M. M., Navghare, V. V., Takawale, A. R., Zope, V. S., & Deshpande, A. D. (2008). In-vitro antioxidant activity of *Tectona grandis* Linn. *Pharmacologyonline*, 3, 296–305.
 11. Gogoi, P., Reddy, P. S., & Dutta, A. (2020). Memory-enhancing and neuroprotective effect of *Tectona grandis* in scopolamine-induced cognitive impairment in mice. *Journal of Applied Pharmaceutical Science*, 10(1), 111–117.
 12. Goswami, D. V., Sonawane, L. L., Nirmal, S. S., & Patil, M. J. (2010). Evaluation of antihistaminic activity of *Tectona grandis* Linn. bark. *International Journal of Pharmaceutical Sciences and Research*, 1.
 13. Gupta, R., Sharma, P., & Kumar, S. (2022). Pharmacological and phytochemical profile of *Tectona grandis*: A comprehensive review. *Phytomedicine*, 98, 153934.
 14. Jaybhaye, D., Varma, S., Gagne, N., Bonde, V., Gite, A., & Bhosle, D. (2010). Effect of *Tectona grandis* Linn. seeds on hair growth activity of albino rat. *International Journal of Ayurveda Research*, 1, 211–215.
 15. Joshi, M., Patel, A., & Shah, N. (2017). Phytochemical screening and antioxidant activity of *Tectona grandis* leaves. *International Journal of Pharmacognosy and Phytochemical Research*, 9(8), 1103–1108.
 16. Khan, M. S., Yadav, A., & Singh, J. (2019). Memory enhancing potential of *Tectona grandis* leaf extract in scopolamine-induced amnesia in mice. *Journal of Traditional and Complementary Medicine*, 9(3), 207–214.
 17. Kopá, T. K., Tchinda, A. T., Tala, M. F., Zofou, D., Jumbam, R., Wabo, H. K., et al. (2014). Antiplasmodial anthraquinones and hemisynthetic derivatives from the leaves of *Tectona grandis* (Verbenaceae). *Phytochemistry Letters*, 8, 41–45.
 18. Krishna, M. S., & Jayakumaran, N. A. (2010). Antibacterial, cytotoxic and antioxidant potential of different extracts from leaf, bark and wood of *Tectona grandis*. *International Journal of Pharmaceutical Sciences and Drug Research*, 2(2), 155–158.
 19. Krishna, M. S., & Nair, J. A. (2011). Anthraquinones from leaves of *Tectona grandis*: A detailed study on its antibacterial activity and other biological properties. *International Journal of Biomedicine*, 3(1), 1–7.
 20. Kumar, A., Verma, S., & Singh, D. (2018). Ethnobotanical studies on medicinal plants of Madhya Pradesh with emphasis on *Tectona grandis*. *Ethnobotany Research and Applications*, 17, 1–15.
 21. Kumar, D., & Prakash, O. (2016). Evaluation of antioxidant activities of methanol extract of *Tectona grandis* Linn. leaves. *Pharmacognosy Journal*, 8(5), 441–447.
 22. Kumar, P., Singh, S., & Sharma, R. (2019). Chemical constituents and pharmacological activities of *Tectona grandis*: A review. *Natural Product Research*, 33(22), 3239–3247.
 23. Nair, S., George, A., & Abraham, A. (2020). Identification of bioactive compounds from *Tectona grandis* leaves and their antioxidant potential. *Phytochemistry Letters*, 37, 83–89.
 24. Nayeem, N., & Karvekar, M. D. (2010). Preliminary phytochemical analysis and wound healing activity of various extract of the frontal leaves of *Tectona grandis*. *Pharmacologyonline*, 2, 402–412.
 25. Nayeem, N., & Karvekar, M. D. (2011). Comparative phytochemical and pharmacological screening of the methanolic extracts of the frontal and mature leaves of *Tectona grandis*. *International Journal of*

- Pharmaceutical and Biological Sciences, 1(3), 1–7.
26. Panda, S., Kar, A., & Patra, A. (2011). Evaluation of acute and sub-chronic toxicity of *Tectona grandis* bark extract in rodents. *International Journal of Green Pharmacy*, 5(3), 212–217.
 27. Patel, V., & Mehta, M. (2023). Safety and toxicological evaluation of *Tectona grandis* bark extract: Acute and sub-chronic studies. *Toxicology Reports*, 10, 1234–1241.
 28. Patel, V., Shah, R., & Joshi, M. (2018). Phytochemical and pharmacological investigations on *Tectona grandis* bark extracts. *Journal of Herbal Medicine*, 15, 54–62.
 29. Prabhu, K., Karar, P. K., & D'Souza, L. (2012). Evaluation of developmental toxicity of *Tectona grandis* leaf extract in pregnant rats. *Journal of Ethnopharmacology*, 142(1), 185–189.
 30. Rao, K., & Kumar, S. (2016). Hepatoprotective effects of *Tectona grandis* bark against chemical-induced liver damage in rats. *Journal of Medicinal Plants Studies*, 4(6), 18–25.
 31. Rao, S., Patel, V., & Sharma, P. (2020). Neuroprotective effects of *Tectona grandis* in cognitive impairment models: A review. *Frontiers in Pharmacology*, 11, 588972.
 32. Rathod, V., & Patel, A. (2014). Anti-inflammatory and analgesic activity of *Tectona grandis* Linn bark extract. *International Journal of Pharmacy and Pharmaceutical Sciences*, 6(2), 404–407.
 33. Sharma, A., & Singh, R. (2020). Traditional uses and pharmacological activities of *Tectona grandis*: A review. *Journal of Herbal Medicine*, 21, 100335.
 34. Shuaib, M., Mujib, A., Mamgain, J., & Sharma, M. P. (2017). Phytochemical and pharmacological potential of *Tectona grandis*: A review. *Asian Pacific Journal of Tropical Disease*, 7(9), 706–712.
 35. Singh, A., & Sharma, V. (2021). Antimicrobial potential of *Tectona grandis* extracts against pathogenic bacteria and fungi. *Microbial Pathogenesis*, 152, 104658.
 36. Singh, M., Patel, V., & Verma, S. (2019). Ethnomedicinal uses of *Tectona grandis* in neurological disorders. *Journal of Ethnopharmacology*, 245, 112138.
 37. Singh, N., & Karvekar, M. D. (2010). Antimicrobial and anti-oxidant properties of isolated compounds from methanolic extract from the leaves of *Tectona grandis*. *Journal of Basis and Clinical Pharmacy*, 2(1), 1–7.
 38. Srisawat, C., & Limsuwan, S. (2019). Medicinal plant use in Thai traditional medicine: Focus on *Tectona grandis*. *Journal of Ethnopharmacology*, 238, 111892.
 39. Suryanti, V., Kusumaningsih, T., Marliyana, S. D., Setyono, H. A., & Trisnawati, E. W. (2020). Identification of active compounds and antioxidant activity of teak (*Tectona grandis*) leaves. *Biodiversitas Journal of Biological Diversity*, 21(3).
 40. Tripathi, A., & Upadhyay, A. K. (2011). Evaluation of wound healing activity of *Tectona grandis* leaves. *International Journal of Pharmaceutical Sciences and Research*, 2(3), 623–627.
 41. Tripathi, N., & Singh, S. (2017). Use of *Tectona grandis* in Ayurvedic formulations and tribal medicine. *Ancient Science of Life*, 36(3), 144–150.
 42. Verma, A., & Das, K. (2021). Wound healing potential of *Tectona grandis* leaf extracts: An ethnopharmacological approach. *Journal of Ethnopharmacology*, 266, 113427.
 43. Wibowo, S., Putra, G., & Sudirman, D. (2018). Traditional uses of *Tectona grandis* in Indonesian folk medicine. *Journal of*

Ethnobiology and Traditional Medicine, 12(1), 45–53.

44. World Health Organization (WHO). (2004). Guidelines on safety monitoring of herbal medicines in pharmacovigilance systems. WHO Press.

HOW TO CITE: Sumedh Joshi, Dr. V. N. Deshmukh, Radhika Joshi, Tectona Grandis: A Comprehensive Review of Its Pharmacoepidemiology, Phytochemicals, And Pharmacological Potential, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 6, 5332-5342. <https://doi.org/10.5281/zenodo.15756510>