VOLUME - 14, ISSUE - 10, OCTOBER - 2025 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Botany

A COMPREHENSIVE REVIEW OF SPHAERANTHUS INDICUS L.

Praveena Anitta. A*	Research Scholar, PG & Research Department Of Botany, Holy Cross College (Autonomous), Affiliated To Bharathidasan University, Trichy-620002, Tamil Nadu, India. *Corresponding Author
Manonmani. R	Assistant Professor, PG & Research Department Of Botany, Holy Cross College (Autonomous), Affiliated To Bharathidasan University, Trichy-620002, Tamil Nadu, India.
Haripriya. B	Research Scholar, PG & Research Department Of Botany, Holy Cross College (Autonomous), Affiliated To Bharathidasan University, Trichy-620002, Tamil Nadu, India.
Shilpa. L. S	Research Scholar, PG & Research Department Of Botany, Holy Cross College (Autonomous), Affiliated To Bharathidasan University, Trichy-620002, Tamil Nadu, India.

ABSTRACT Sphaeranthus indicus L. (Asteraceae) is a widely used medicinal plant in traditional and modern medicine, valued for its diverse therapeutic applications. Traditionally, it has been employed to manage respiratory, digestive, neurological, skin and systemic disorders, as well as for blood purification, aphrodisiac and urinary infections. Phytochemical investigations have revealed a rich profile of bioactive compounds, including eudesmanolides, sesquiterpenoids, flavonoids, sterols, alkaloids, amino acids, glycosides, diterpenoids, tannins, proteins, carbohydrates and essential oils, with flavonoids and phenolics being particularly abundant. Pharmacological studies demonstrate that extracts of S. indicus L. exhibit strong antioxidant, anti-inflammatory, antibacterial, hepatoprotective, wound healing and anti-diabetic activities. The observed bioactivities are supported by its complex phytochemical composition, validating its traditional uses and highlighting its potential for drug discovery and therapeutic development.

KEYWORDS : Sphaeranthus indicus, Traditional medicine, Phytochemical profiling, Pharmacological studies

INTRODUCTION

Herbal medicines have been utilized by mankind since ancient times as a major source of healthcare. Ayurveda, the oldest traditional system of medicine in India, documents the therapeutic applications of numerous plants. Among them, Sphaeranthus indicus L. belonging to the family Asteraceae, is an important medicinal plant widely recognized for its diverse pharmacological activities.[3]

The plant is commonly known as "Kottaikkarantai" in Tamil and has been valued in both traditional and modern systems of medicine for its broad range of therapeutic uses.[9]

Medicinal Uses

In Ayurveda, Sphaeranthus indicus L. is traditionally used to manage respiratory disorders (tuberculosis, bronchitis, asthma), digestive issues (indigestion, vomiting, spleen disorders), skin and systemic conditions (elephantiasis, leukoderma), neurological disorders (hemicrania, epilepsy) and as a blood purifier, aphrodisiac and urinary remedy. Externally, it is applied as a poultice for rheumatic pain. Modern studies have confirmed its hepatoprotective, antihelmintic, antigout, antitussive, antioxidant, nephroprotective, immunostimulant and antidiabetic activities, supporting its traditional use and potential for drug discovery[11].

Phytochemical Studies:

Khandelwal [6] reported that S. indicus L. contains eudesmanolides, sesquiterpenoids, flavonoids, sterols, alkaloids, amino acids and essential oils, with flavonoids abundant in the aqueous extract (AESI).

Khanam et al.,[5] noted that, although the flowers are traditionally used, their detailed phytochemical composition is underexplored; methanolic flower extract (MESIF) showed moderate phenolic content. Sarle et al.,[8] reported that whole-plant extracts contained alkaloids, flavonoids, glycosides, diterpenoids, tannins, proteins, carbohydrates and total phenolic compounds, highlighting the plants medicinal relevance.

Table - 1 Phytochemical Composition Of Sphaeranthus Indicus L.

Phytochemical Category	Reported Constituents
Eudesmanolides	Present
Sesquiterpenoids	Present including sesquiterpene lactones
Flavonoids	Abundant; flavone and isoflavone glycosides detected
Sterols	Present as sterol derivatives
Alkaloids	Present in various extracts
Amino acids	Present
Essential oils	Monoterpene and sesquiterpene hydrocarbons
Glycosides	Detected in methanol extracts
Diterpenoids	Detected
Tannis	Present
Proteins	Present
Carbohydrates	Present
Phenolics	Moderate to high content

Pharmagological Studies:

Antioxidant Activity:

Sharma et al.,[10] reported that the antioxidant compounds of Sphaeranthus indicus L. scavenge free radicals, thereby protecting skin cells from oxidative damage and contributing to anti-aging effects.

Shirwaikar et al.,[12] reported that the ethanolic extract of Sphaeranthus indicus L. (1000 µg/ml) showed strong antioxidant activity, with highest scavenging against ABTS (41.99%), followed by DPPH (33.27%), superoxide (25.14%) and nitric oxide radicals (22.36%), along with moderate iron

chelation (14.2%). The total antioxidant capacity was 160.85 nmol/g ascorbic acid equivalent, supporting its therapeutic relevance.

Anti-Inflammatory:

Singhal et al.,[13] reported that topical application of Sphaeranthus indicus L. ointments reduces inflammation in arthritis, dermatitis and insect bites. The anti-inflammatory effect is associated with inhibition of inflammatory mediators and enzymes, resulting in reduced pain and swelling.

Antimicrobial:

Duraipandiyan et al.,[2] reported the antimicrobial activity of Sphaeranthus indicus L. Extracts of aerial parts and flowers prepared with n-hexane, benzene, chloroform, ethyl acetate and acetone were tested for antibacterial and antifungal properties. Antimicrobial activity was assessed using the disc diffusion method at concentrations of 5, 2.5 and 1.25 mg/disc and the minimum inhibitory concentration (MIC) was determined by the broth microdilution method in the range of 5–0.039 mg/ml.

Venkatachalam et al.,[16] investigated the antibacterial potential of Sphaeranthus indicus L. Aqueous, methanolic extracts and oil were tested against Staphylococcus aureus, Streptococcus faecalis and Escherichia coli using the filter paper disc method. The aqueous leaf extract showed the strongest activity, with inhibition zones of 25 mm against S. faecalis and 22 mm against S. aureus, indicating that S. indicus leaves may serve as promising alternatives to conventional antimicrobial agents.

Antibacterial:

Thakur et al.,[15] reported that Sphaeranthus indicus L. leaf extracts possess significant antibacterial activity. Using the agar well diffusion assay, crude extracts and solvent fractions from the Set-PCE and Set-HDB systems showed varying inhibition, with Gram-positive bacteria more susceptible than Gram-negative strains. The study indicated that the most active fractions may contain bioactive compounds with potential for new antibacterial drug development.

Hepatoprotective Activity:

Sundari et al.,[14] evaluated the hepatoprotective activity of ethanolic extract of the aerial parts of Sphaeranthus indicus L. (200 and 300 mg/kg b.w.) against paracetamol-induced liver damage in rats. The extract at 300 mg/kg exhibited significant protection against hepatocellular injury.

Wound Healing Activity:

Begum et al.,[1] conducted a randomized, placebo-controlled, single-blind clinical study on 45 patients (30 in the test group and 15 in the control group) to evaluate the efficacy and safety of a formulation containing Sphaeranthus indicus L. Lawsonia inermis L. cream and Plumbi oxidum. The test formulation was reported to be effective in promoting healing and alleviating symptoms of cervical erosion with cervicitis.

Khadabadi et al.,[4] demonstrated that creams containing Sphaeranthus indicus L. promote wound healing by enhancing collagen deposition and fibroblast proliferation, while its antimicrobial properties aid in preventing wound infections.

Anti-diabetic Activity:

Muhammad et al.,[7] reported that methanolic extract of Sphaeranthus indicus L. (300 mg/kg b.w.) in alloxan-induced diabetic rabbits significantly lowered blood glucose, cholesterol, triglycerides, LDL, SGOT and SGPT levels, while increasing HDL, comparable to diamicron (80 mg/kg).

The pharmacological potential of Sphaeranthus indicus L. is supported by its broad spectrum of bioactivities, reflecting its complex phytochemical makeup (Table 2).

Table - 2 Pharmacological Activity And Their Findings In Sphaeranthus Indicus L.

Activity	Key Findings
Antioxidant	The extract exhibits strong antioxidant potential by scavenging free radicals and protecting skin cells, as demonstrated through ABTS, DPPH, superoxide, nitric oxide and iron chelation assays.
Anti-inflammatory	Reduces inflammation in arthritis, dermatitis, insect bites by inhibiting inflammatory mediators and enzymes.
Antimicrobial	Activity against bacteria & fungi; aqueous extract inhibited S. faecalis (25 mm) & S. aureus (22 mm), suggesting potential as alternative antimicrobial.
Antibacterial	Gram-positive bacteria more susceptible; active fractions have bioactive compounds for new drug development.
Hepatoprotective	Significant protection against paracetamol-induced hepatocellular injury at 300 mg/kg.
Wound Healing	Promotes healing, alleviates cervical erosion symptoms, enhances collagen and fibroblast proliferation, prevents infection.
Anti-diabetic	Lowered blood glucose, cholesterol, triglycerides, LDL, SGOT, SGPT; increased HDL; comparable to diamicron.

CONCLUSION:

Sphaeranthus indicus L. is a medicinally significant plant with a rich phytochemical profile, including flavonoids, phenolics, alkaloids, terpenoids, sterols, glycosides and essential oils. Its diverse bioactive constituents contribute to a wide range of pharmacological activities, such as antioxidant, anti-inflammatory, antimicrobial, antibacterial, hepatoprotective, wound healing and anti-diabetic effects. The scientific evidence supports its traditional use in Ayurveda for managing respiratory, digestive, neurological, skin and systemic disorders. The comprehensive phytochemical and pharmacological data highlight the plant's potential as a source of novel therapeutic agents and warrant further research for isolation of specific bioactive compounds and development of standardized herbal formulations.

Acknowledgement

We thank the Department of Science and Technology, Government of India, for providing support through the Fund for Improvement of S&T Infrastructure in Universities and Higher Educational Institutions (FIST) program (Grant No. SR/FIST/College-/2020/943).

REFERENCES:

1. Begum, H. S., & Arshiya, W. S. (2011). Efficacy of Sphaeranthus indicus and cream of Lawsonia inermis in cervical erosion with cervicitis. European Journal of Integrative Medicine, 3(3), 183–188.
2. Duraipandiyan, V., Kannan, P., & Ignacimuthu, S. (2009). Antimicrobial activity of Sphaeranthus indicus L. Ethnobotanical Leaflets, 13, 422–430.
3. Garg, M., & Dwivedi, N. (2021). Physicochemical and phytochemical studies on Sphaeranthus indicus Linn. with HPTLC fingerprinting. Journal of Drug Delivery and Therapeutics, 11, 100–107.
4. Khadabadi, S. S., & Deore, S. L. (2010). Evaluation of wound healing activity of Sphaeranthus indicus Linn. in rats. Pharmacologyonline, 3, 846–854.
5. Khanam, A., Roman, T. S., Ferdous, A., Siddique, M. J., Antu, N. N., Hossain, M. E., Arman, M., & Islam, M. N. (2024). Investigation of the pharmacological characteristics of Sphaeranthus indicus flowers using phytochemical analysis. Journal of Advanced Biotechnology and Experimental Therapeutics, 7(3), 642–657.
6. Khandelwal, K. R. (2006). Practical pharmacognosy (15th ed., pp. 149–156). Nirali Prakashan.
7. Muhammad, R. T., Malik, S., Ghulam, M., & Waseem, H. (2011). Determination of the anti-diabetic effect of methanolic extract of Sphaeranthus indicus L. on

alloxan induced diabetic rabbits. Latin American Journal of Pharmacy, 30(3), 378–382.
8. Sarle, Y. K., Goyal, S., & Chaurse, V. K. (2020). Preliminary phytochemical evaluation of Sphaeranthus indicus Linn of Asteraceae family. Wesleyan Journal of Research, 13(47), 14–22.
9. Selvamoorthy, H., Elumalai, K., Madhavan, M. K., Veerapathiran, V., Suresh Babu, Y. S., & Ranganathan, S. (2024). A review of phytopharmacology and formulation of Sphaeranthus indicus. World Journal of Current Medical and Pharmaceutical Research, 6(2), 34–50.
10. Sharma, A., & Sisodia, S. S. (2022). Preliminary phytochemical evaluation of aerial parts of Sphaeranthus indicus Linn. (Asteraceae). International Journal of Pharmacognosy, 9(2), 36–40.
11. Sharma, V., Suresh, D. K., Singh, M., & Kumar, S. (2012). Antioxidant and protective effects of Sphaeranthus indicus extract on 7,12-dimethylbenz (a)anthracene-induced genotoxicity in bone marrow cells of Swiss albino mice. Asian Pacific Journal of Tropical Biomedicine, 2(1), S52–S57.
12. Shirwaikar, A., Prabhu, K. S., & Punitha, I. S. R. (2006). In vitro antioxidant studies of Sphaeranthus indicus Linn. Indian Journal of Experimental Biology, 44, 993–996.
13. Singhal, K. G., & Gupta, G. D. (2012). Pharmacological evaluation of anti-inflammatory activity of Sphaeranthus indicus in rats. Journal of Ethnopharmacology, 141(3), 1077–1081.
14. Sundari, K., Govindaraju, G., & Bharathi, B. (2011). Hepatoprotective effect of ethanolic extracts of Sphaeranthus indicus (Linn.) on paracetamol-induced liver toxicity in rats. International Journal of Applied Biology and Pharmaceutical Technology, 2(2), 315–321.
15. Thakur, R., Singh, R., & Jain, N. (2012). Evaluation of antibacterial activity of Sphaeranthus indicus L. leaves. Journal of Pharmacy Research, 5(8), 4382–4388.
16. Venkatachalam, D., Samuel, T. B., & Muddukrishniah, K. (2018). Antimicrobial activity of leaf of Sphaeranthus indicus against some selected human pathogenic bacteria. Journal of Medical Pharmaceutical and Allied Sciences, 7(12), 1008–1016.