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A Review on Tabebuia Rosea Plant and its Medicinal Uses

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Abstract : *Tabebuia rosea*, sometimes known as the pink trumpet tree, is a tropical flowering species that is well-known for both its ornamental appeal and traditional medicinal purposes. This plant, which belongs to the Bignoniaceae family, has sparked growing scientific attention due to its rich phytochemical content and possible therapeutic applications. *T. rosea's* bark, leaves, and flowers contain a range of bioactive chemicals, including flavonoids, tannins, alkaloids, quinones, lapachol, β-lapachone, and phenolic acids. These elements have been shown to significantly contribute to the plant's pharmacological profile. Experimental research have revealed a wide range of biological activities, including antibacterial, anti-inflammatory, antioxidant, antimalarial, and anticancer characteristics, many of which back up its traditional usage in herbal therapy. Notably, lapachol and related naphthoquinones have demonstrated promise cytotoxic activity against cancer cells, whilst flavonoid-rich extracts have a high free radical scavenging capacity. Despite these promising results, more research, including comprehensive pharmacokinetics, toxicity, and clinical trials, is required to properly confirm and exploit Tabebuia rosea's therapeutic potential. This review focuses on the plant's phytochemical diversity and pharmacological properties, emphasizing its importance as a significant natural resource in drug discovery and development.

IndexTerms **– Pink Trumpet tree, Phytoconstituents, Pharmacological properties, Tabebuia rosea.**

I.INTRODUCTION

Antibacterial substances may be found in plants, and numerous researchers worldwide are examining the antibacterial properties of medicinal plants used in conventional or alternative healthcare systems. Each plant synthesizes a wide range of phytochemicals, which are substances that are produced in great quantities by plants. In addition to preserving the physiological functions of the plant, phytochemicals shield it from outside invaders including bacteria, fungus, insects, and animals that prey on it. Natural chemicals are currently present in a variety of pharmaceutical products, including medications that contain variants of these natural molecules1 . Tabebuia rosea (Bertol.) DC is a member of the family and is frequently referred to as the "Pink Trumpet Tree" because to its stunning blooms. Tropical areas are where they are primarily found. The presence of phenols, flavonoids, sugar glycoside, heterocyclic quinoline, and aromatic chemicals is revealed by the phytochemical analysis of Tabebuia rosea. Timber is commonly utilized in ordinary building in many European countries2,3 . Aerial portions of the tree were traditionally used to treat uterine cancer and malaria. For constipation and anemia, a decoction of the tree's cortex is used. The roots, leaves, and petals were also used to treat a variety of illnesses, including tonsil irritation, fever, discomfort, and perspiration. An anticancer medication called lapachol is a botanical substance that was extracted from T. rosea. Additionally, it is advised for its anti-malarial and anti-panasomal properties4.

TAXONOMY AND BOTANICAL DESCRIPTION:

Kingdom: Plantae
Sub Kingdom: Viridiplantae
Division: Tracheophyte
Subdivision: Spermatophyte
Class: Magnoliopsida
Order: Lamiales
Family: Bignoniaceae
Genus: Tabebuia
Species: Rosea.

This blooming plant is a member of the Bignoniaceae family. The 15-meter-tall Tabebuia rosea is renowned for its exquisite blooms. Tropical regions are where they are primarily found. The long, green fruits resemble bean pods and measure 20–40 cm (8–16 inches) in length. When ripe, the fruits turn brown and contain tiny, flat, heart-shaped seeds. [2] Tabebuia rosea may thrive in moderate water conditions and is propagated by seed. Leaves: Five leaflets per stalk, palmately complex, oppositely oriented leaves. Leaflets measure roughly 5 to 22 cm by 2 to 11 cm. Leaflets have pointy ends and an elliptic shape. Flowers: Large, showy, trumpet-shaped flowers with five petals that range in length from 5 to 8 cm. Their habitat is polycarpic. Fruits: When fully ripe, fruits split

open. The mature fruits have a golden or yellow hue. They are dry fruit that dehisces. Seeds: Affixed to the middle wall are the seeds. Winged traits on seeds allow the wind to disseminate them5.

PHYTOCHEMICAL SCREENING:

The leaves of Tabebuia rosea were thoroughly cleansed with tap water and allowed to dry in the shade. The dried leaves are pulverized into a 40 mesh fine powder. Pour 500ml of ethanol into a thimble, then use the Soxhlet equipment for 8–10 hours to extract 100g of powder. To get rid of things that couldn't be extracted, the extract was run through Whatman No. 1 filter paper. After drying the complete extract, various concentrations were made for additional processing.6 The method used to remove the Tabebuia rosea flowers was comparable to that used to extract the leaves. Alcoholic (ethanolic) solvent was used to extract several Tabebuia rosea components. GC-MS analysis of Tabebuia rosea revealed the presence of alkane, sugar glycoside, phenol, alkane ethanol, flavonoids, heterocycle quinoline, phenolic aldehyde, aromatic compound, coumarin, organo borane, epoxide, fatty alcohol, terpenoid, essential oil, and aromatic carboxylic acid. GC-MS identified several phytocomponents in the ethanolic extracts of the whole Tabebuia rosea plant, including cycloopentane methyl, 1,6:2,3- dianhydro-4-o-acetyl-beta-d-allopyranose, 3-hydroxy phenyl acetylene, cyclohexaneethanol, 4-methyl-beta-methylene-trans, and others. 4H-pyran-4-one, 3,5-dihydroxy-6-methyl-2,3- dihydr, Cinnamaldehyde, benzene, 7-quinolinol, Benzofuran, 1,methyl-2-nitro, 2,3-dihydro, cyclohexane, D-erythro pentose, 1-ethyl4-methyl, cis, 2-furancarboxaldehyde, 5- hydroxymethyl, 9-borabicyclo(3.3.1)nonane, phenol, 2-(2-methylpropyl), 1-hexacosanol, 2-deoxy, oxirane, hexadecyl-, santolina triene, and 2-methyl benzoic acid3 . Because T. rosea flavonoids may scavenge hydroxyl and superoxide-anion radicals, they have been demonstrated to have health benefits7.

BOTANICAL TRAITS:

Because of the color of its flowers, Impetiginosa is often referred to as a pink trumpet tree or a purple trumpet tree. It is known in English as purple tabebuia, taheebo (ant wood), and ipe. It is referred to as poui in French and as lapacho negro, lapacho, and quebracho in Spanish. Lapachobaum, Trompetenbaum, and Feenkraut are the common names in German. This plant is known in Portuguese as Ipe-roxo (red, thick bark), Pau d'arco (bow tree), and Ipe. T. impetiginosa is well-known because of how noticeable it is9 .

PHARMACOLOGICAL ACTIVITIES:

Anti-bacterial activity: The leaf extract's initial phytochemical examination showed that it included sugars, tannins, flavonoids, saponins, terpenoids, glycosides, and acids, all of which indicated antibacterial action. The agar disc diffusion assay was used to evaluate the leaf extracts' antibacterial properties. The collected microbial strains were inoculated into a conical flask that held 100 milliliters of nutritional broth. To prepare the media, Muller-Hinton Gram-positive bacteria such as Staphylococcus epidermis, Micrococcus luteus, Staphylococcus aureus, Streptococcus sp., and Bacillus subtilis were incubated with agar on petri dishes, while gramnegative bacteria included Salmonella typimurium, Pseudomonas aeruginosa, Klebsiella pneumoniae, Escherichia coli, and Pseudomonas sp. The inhibitory zone that developed around the discs was measured in order to determine the antibacterial activity6 .

Antioxidant activity: Strong antioxidant properties were demonstrated by in vitro research of Tabebuia rosea ethanolic extract. Because of its ability to scavenge DPPH, hydroxyl radicals, metal chelating, ferric thiocyanate, and the thiobarbituric acid assay, Tabebuia rosea is recommended as a feasible natural source of antioxidants. An ethanolic solution of DPPH was mixed with 40µl of extract solution at different doses. After allowing the mixture to stand for five minutes, the absorbance at 517 nm was determined using spectrophotometry. Additionally, a blank sample with the same concentration of ethanol and DPPH was made. Every determination was made in triplicate. The studied samples' radical scavenging activities were computed and reported as a percentage of inhibition. A nitric oxidescavenging activity assay was employed to evaluate antioxidant activity. Furthermore, the reducing power test, scavenging of superoxide anion, and general antioxidant activity of phosphomolybdenum10 .

Anti-Inflammatory activity: Inflammation is the immune system's response to an irritation. An irritation may be caused by a bacterium or a foreign object. The anti-inflammatory action of murine macrophages was investigated in vitro. Tabebuia rosea extracts' capacity to stop the production of significant inflammatory mediators like TNF-ά, NO, and PGE2. This work demonstrates the antiinflammatory properties of the methanol extract made from Tabebuia rosea stems and the discovery of novel iridoid esters with anti-inflammatory properties from the inner bark of the plant. Examining various Tabebuia species is crucial for identifying novel natural sources of physiologically active compounds that may be employed in medication development10 .

Larvicidal activity: The larvicidal effects of Tabebuia rosea flower extract were observed in both Culexquinquefasciatus and Anopheles subpictus larvae. To assess the larvicidal bioassay's activity, one gram of crude extract was first diluted in 100 milliliters of methanol (stock solution). Different concentrations were made from the stock solution. As an emulsifier, polysorbate 80 was employed. The experiment was run at room temperature for twenty-four hours. To evaluate the activity, larvae were gathered in five groups of twenty in 249 milliliters of water and 0.1 milliliters of the required concentration of plant extracts. Following a 24- hour exposure period, the number of dead larvae was counted, and the percentage of mortality was calculated using the average of five repetitions. Culexquinquefasciatus had a regression value of 0.974 and an LC50 of 586.68, while Anopheles subpictus had a regression value of 0.981 and an LC50 of 241.7211 .

Anti-Proliferative activity: The quick creation of new components or cells is known as proliferation. Using the MTT assay, antiproliferative activity was assessed. Examined against HepG2, B16F10, MCF7, and HeLa cell lines, a chloroform extract of Tabebuiarosea's inner bark shown an antiproliferative activity12 .

TRADITIONAL AND ETHNOMEDICINE USES: The Portuguese and Spanish populations used the names Pau d'arco and lapacho to identify about 26 kinds of trees and shrubs that are found in Tabebuia. Despite being native to the American tropics, which extend from Mexico to southern South America, the majority of these species are found in Brazil and its neighboring countries. The original people preferred the inner bark for medicinal uses, even though the heartwood has greater strength. Less often utilized are flowers and foliage.13 . D'arco gained popularity in North America and Europe in the early 1980s. At least a million individuals frequently consumed the bark or wood's infusion and decoction14 . Extracts from Tabebuia were employed by ancient indigenous cultures as a snake bite remedy15 . In addition to its suggested anti-malarial and antipanasomal properties, Tabebuiarosea (Bertol.) DC. is regarded as an anticancer bean. In addition, the flowers, leaves, and roots were used to treat tonsillitis, inflammation, fever, discomfort, and sweetening, among many other conditions. Tabebuia rosea flowers exhibit larvicidal properties16,17 .

FUTURE PROSPECTS:

In recent years, Tabebuia rosea has garnered significant attention in the fields of pharmaceutical and biomedical research, owing to its rich repository of bioactive compounds such as lapachol, quercetin, and various flavonoids, which have demonstrated promising antimicrobial, anti-inflammatory, antioxidant, and potential anticancer properties in preliminary studies, thereby positioning this species as a valuable natural resource for the development of novel therapeutic agents, drug formulations, and integrative medicine approaches, while simultaneously encouraging further pharmacological investigations and clinical trials to validate its efficacy and safety in modern healthcare applications.

CONCLUSIONS:

Tabebuia rosea is a plant with a complex phytochemical profile, including lapachol, βlapachone, quercetin, flavonoids, tannins, and phenolic components, making it a promising pharmacological candidate. Secondary metabolites have been scientifically linked to a variety of bioactivities, including antibacterial, anti-inflammatory, antioxidant, antimalarial, and anticancer properties. The presence of naphthoquinones, particularly lapachol, has piqued interest due to their cytotoxic effects and potential for development as anticancer drugs. Furthermore, the antioxidant qualities of its flavonoids and phenolics indicate a potential function in treating oxidative stress-related disorders, which are becoming more common in modern culture. The incorporation of these pharmacologically active molecules into therapeutic applications may pave the way for the creation of new plant-based medications. However, despite promising in vitro and in vivo investigations, large-scale clinical trials and toxicity assessments are required to fully understand the efficacy, safety, and dosage parameters required for human use. As a result, further multidisciplinary research—including phytochemical analysis, molecular pharmacology, and clinical validation—is required to fully realize Tabebuia rosea's therapeutic potential. Its therapeutic flexibility not only validates its use in traditional medical systems, but also establishes it as a potential botanical resource for future pharmaceutical innovation.

FiguresandTables

Fig.1.Tabebuia Rosea flowers

Fig-2 Tabebuia rosea plant

Name of Phytochemical	Result	Name of phytochemical	Result
Anthocyanins	Absent	Flavones	Present
Cardioglycosides	Present	Free anthroquinones	Absent
Carotenoids	Absent	Phenols	Present
Chalcones	Absent	Phlobatannins	Absent
Combined anthroquinones	Absent	Saponins	Absent
Coumarins	Present	Starch	Absent
Emodin	Absent	Steroids	Present
Volatile oil	Present	Tannins	Present
Flavanoids	Present	Terpenoids	Present

Table-1 Phytoconstituents of Tabebuia Rosea8 .

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