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A REVIEW ARTICLE ON PLUMERIA ALBA

Sk. Aayusha Khan*, P. Sai Padma Priya, P. Reshma Khan, S. Manikanta, K. Mounika, P. Swathi, V. Sai Kishore.

Department of Pharmaceutics. Bapatla college of pharmacy Bapatla -522101.

abstract:

Native to tropical America, Plumeria alba is a tiny, laticiferous tree or shrub known as White Champa. Its leaves and stem have been studied for their phytoconstituents, which are used in a number of traditional medicines to treat a variety of illnesses. The plant is mostly grown for its fragrant and beautiful blossoms, which are highly valued for their therapeutic properties. The fruit is edible, the corymbose fascicles are fragrant, and the leaves are arranged lanceolate to oblanceolate with white flowers. Their latex, which is usually harsh and caustic, is often the cause of their therapeutic qualities. Scabies, herpes, and ulcers are treated using latex. Hemostatic qualities are present in seeds. Additionally, its bark is bruised and used to cover hard tumors with plaster. The others, however, have hypotensive, diuretic, cardiotonic, and purgative effects.

Key Words: Herbal medicine, Plumeria alba, latex, cardiotonic

Corresponding author:

Sk. Aayusha Khan,

Department of Pharmaceutics,

Bapatla college of pharmacy Bapatla -522101.

QR code

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INTRODUCTION:

Although the apocynaceae family is extensively found in tropical and subtropical locations, it does not do well in areas with high temperatures.[1] This family includes genera including adenium, alstonia, alyxia, nerium, plumeria, and vinca, all of which have been widely documented to have empirical support as traditional remedies.[2] However, the plant was typically employed for skin treatments, such as killing lice, because of its toxic milk latex.[3] Traditionally, alyxia was utilized for postpartum care, whereas alstonia was used for respiratory conditions. Vinca was utilized to treat diabetic patients, while nerium was used empirically to treat cancer.[4] According to scientific reports, the herbs have pharmacological effects, such as acting as an antioxidant for adenium, while alstonia is employed as an antiviral. While nerium and vinca are poisonous herbals used as CNS depressants and antitumor, respectively, alyxia is well-known for its antifungal properties.[5] The leaves, bark, and flowers of Plumeria alba have all been used in traditional medicine to cure a variety of illnesses, including rheumatism, fever, and skin disorders. Alkaloids, flavonoids, and terpenoids are among the plant's bioactive substances; they have been shown to have antibacterial, anti-inflammatory, and antioxidant qualities.[6]

GEOGRAPHY

Although it is native to the tropics, frangipani thrives anywhere there is no frost. The stems and branches are substantial and meaty. The tree is shaped like a classic V. When the bark is cut, white sap emerges, which can irritate the skin. The enormous funnel-shaped flowers have a wonderful scent and are white with yellow in the center. When flowers fall, they may leave behind litter. The plant can withstand some salt and dryness.

Frangipani is renowned for its strong aroma. Beautiful, spiral-shaped blossoms that bloom from June to November at the apex of branches. The tree itself has a unique appearance, with coarse, deciduous leaves that are 20 inches long and only grouped at the terminals of thick, grey-green branches that resemble sausages. With age, the upright, densely packed branches on the trunk take the shape of an umbrella or vase. Although they can break, they are often soft and brittle. sturdy unless they are struck or disrupted mechanically. When the branches are injured or punctured, a milky sap is released.

GROWING SEASON AND TYPE

The white plumeria should be planted in full summer sun in a healthy, well-draining location. Although a fertile location is ideal, this tree may grow in loam, sand, or clay soils and loves a pH of 6.1 to 7.5. 2. When there isn't any rain, water the young white plumeria occasionally. For the duration of the growing season, one inch of water each week is adequate. To prevent the roots of this plant from decaying, do not overwater. 3. During the growing season, feed white plumeria twice a month. Make use of a high-phosphorus, water-soluble fertilizer.

1. Leaf of Plumeria.alba
2. Plumeria.alba tree
3. Flower of Plumeria.alba

GENERAL DETAILS

- Common names include White Frangipani, Caterpillar Tree, Pagoda Tree, Pigeon Wood, Nosegay Tree, and White Frangipani.
- Scientific name: P. alba.
- Apocynaceae is the family.
- Availability: Usually found in a wide range of locations within its hardiness zone.
- Native Range: Lesser Antilles, Puerto Rico Zone: 10–12
- Spread: between 15 and 25 feet; Height: between 15 and 25 feet

LEAVES

Simple, alternate, oblong to elliptic, thick and leathery, many to 14 inches long and 1½ inches wide, strongly recurved margins, hairless on upper surface, whitish below, many lateral veins almost at right angle from the midribs.

FLOWERS

Salverform, five waxy white petals, with yellow centers, arranged on cymes on branch tips.

FRUITS

Not shown follicles, brown long-pointed, usually born in Paris.

MORPHOLOGICAL CHARACTERISTICS

White Frangipani can grow as a tree or small shrub that is between 0.9 and 6.1 meters tall, with thick succulent branches that are widely spaced and frequently coated in "knobby" protuberances. The leaves are grouped together close to the branch tips. They have a distinctive obovate shape, are enormous (6–22 cm long, 2–7 cm wide), and have rounded leaf tips as opposed to pointed ones like those of other species. The dark, leathery leaves have noticeable parallel secondary veins that extend from the midvein to the leaf edges, and they are often glossy on the upper surface. On a long, thick stalk, the flowers of this plant are carried in clusters at the tips of the branches**.**

MICROSCOPY

The use of microscopy the bark powder was discovered to be odorless, brown in color, and slightly bitter in flavor. The powder revealed sclerenchyma, parenchyma cells, phloem fibers, starch grains, and cork cells upon microscopic inspection. A variety of parameters were determined to be 6.0, 2.3, 1.8, 1.33, and 20.0, respectively: total ash, acid insoluble ash, water soluble ash, loss on drying, and swelling index. The bark of P. alba had a significant level of hot water-soluble extract. This plant contains alkaloids, carbohydrates, flavonoids, phenolic compounds, and tannins, according to preliminary phytochemical screening.[6]

PHYTOCHEMICAL CONSTITUENTS

Plumeria alba phytochemical tests White Frangipani, or Plumeria alba, is a tropical plant that is abundant in phytochemicals. The bioactive substances found in plants are identified and measured using phytochemical assays.[7] Common phytochemical tests for Plumeria alba include the following: Initial Phytochemical Examinations.

1. Alkaloid Test: which finds alkaloids like plumerinine and plumeridine. Technique: Hager's reagent, Mayer's reagent, or Dragendorff's reagent.

2.Glycoside Test: Determines whether glycosides, like plumericin, are present Method: Benedict's, Fehling's, or Molisch's test.

3.Flavonoid Test: Identifies the presence of flavonoids, including kaempferol and quercetin. Technique: HCl-Mg test, AlCl3 test, or Shinoda test.

4.Phenol Test: Determines whether phenolic chemicals, like plumeric acid, are present. Method: test with ferric chloride.

5.Saponin Test: Indicates whether saponins, like plumerioside, are present. Method: Hemolysis test or froth test.[8]

PHARMACOLOGICAL ACTIVITIES

1. Antioxidant and anti-inflammatory properties:
   It has been demonstrated that plumeria extracts have antioxidant and anti-inflammatory qualities, which may help ward off chronic illnesses like diabetes, heart disease, and cancer.[9]
2. Antipyretic and Analgesic Properties:
   Plumeria extracts have been shown to have ana lgesic (pain-relieving) and antipyretic (fever-reducing) properties, which suggests that they could be used as natural treatments for fever and pain.[10]
3. Antimicrobial Actions:
   It has been demonstrated that plumeria extracts have antibacterial qualities that can aid in the f ight against viral, bacterial, and fungal illnesse s.[11]
4. Anticancer Actions:
   Plumeria extracts may have anticancer qualitie s; according to certain studies, although further research is required to prove this.[12]
5. Properties of Wound Healing:
   By enhancing tissue strength, decreasing inflammation, and boosting collagen synthesis, plumeria extracts have been shown to accelerate wound healing.[13]
6. Antiviral Actions:
   It has been demonstrated that plumeria extracts have antiviral qualities that can aid in the fight against viral illnesses like herpes and HIV.[14]

7. Activities to Prevent Arthritis:
Extracts from plumeria may assist in lowering inflammation and easing arthritic symptoms. It is important to remember that even though plumeria extracts have demonstrated encouraging pharmacological properties, additional study is required to verify their effectiveness and safety for usage in humans. Furthermore, without first speaking with a healthcare provider, Plumeria should not be utilized in place of traditional medical therapy.[15]

LIST OF RESEARCH ARTICLES ON PLUMERIA alba

S.no	Title of research	Summary	Reference
1.	Antipyretic activity of the plumeria rubra leaves extract	Investigations were conducted into the antipyretic properties of the ethanolic extract of plumeria alba leaves. Pyrexia occurs in albino rabbits when 0.5 ml/kg body weight of cooked milk is administered intraperitoneally. When compared to the use of solvent and aspirin (a standard drug), intraperitoneal (i.p.) injection of an ethanolic extract of plumeria alba leaf at a concentration of 200 mg/kg body weight was demonstrated to considerably lower the raised body temperature of rabbits.	**[16]**
2.	Investigation of antarthritic potential of plumeria alba L. leaves in acute and chronic models of arthritis	Examining Plumeria alba L. Leaves' Antiarthritic Potential in Acute and Chronic Arthritis Models The goal of the current study was to assess the antiarthritic potential of several hydroalcoholic extract fractions from P. alba leaves. Materials and Procedures. To create a hydroalcoholic extract of Plumeria alba L., the leaves were extracted using hydroalcohol (30: 70). Ethyl acetate and n-butanol were used to further fractionate this extract, yielding EAPA and BPA, respectively.	**[17]**
3.	Screening of in-vitro antioxidant profile of different extracts of the leaves of plumeria alba Linn	Evaluation of the in-vitro antioxidant profile of several leaf extracts from Plumeria alba Linn reveals the leaves' capacity to scavenge free radicals. The current work evaluated the phytochemical examination of petroleum ether, chloroform, and methanol extracts of Plumeria alba leaves, focusing on successive extractive values, thin layer chromatographic profiles, and phytochemical screening. Using the reference medication ascorbic acid, the DPPH radical scavenging assay was also used to quantify each extract's in vitro antioxidant capacity. It was discovered that several extracts contained phytoconstituents like flavonoids, polyphenols, terpenoids, and glycosides. The DPPH radical scavenging assay demonstrated the strong free radical scavenging activity.	**[18]**
4.	Pharmacological, phytochemical, and traditional uses of plumeria alba Linn Indian medicinal plant	The plant is mostly grown for its fragrant and beautiful blossoms, which are highly valued for their therapeutic properties. The fruit is edible, the leaves are lanceolate to oblanceolate with white blooms, and the corymbose fascicles are aromatic. Their latex, which is usually harsh and caustic, is often the cause of their therapeutic qualities. Scabies, herpes, and ulcers are treated using latex. Hemostatic qualities are present in seeds. Additionally, its bark is bruised and used to cover hard tumors with plaster. The others are used as diuretics, hypotensives, cardiotonics, and purgatives.	**[19]**
5.	Phytochemical analysis and GC-MS profiling in the flower of plumeria alba	GC-MS Profiling and Phytochemical Analysis in Plumeria alba Flowers* Gas chromatography-mass spectrometry (GC-MS) and phytochemical screening assays were used to examine the phytochemical components of Plumeria alba flowers. A variety of concentrations of saponins, flavonoids, tannins, steroids, volatile oil, and phenolic compounds were found in the flower of P. alba, according to the phytochemical screening of hexane, dichloromethane, ethyl acetate, butanol, and aqueous extracts. Squalene, bis(2-ethylhexyl) phthalate, methyl (methyl 4-O-methyl-α-d-mannopyranoside) uronate, tricyclo [7.2.0.0(2,6)], undecan-5-ol, and 2,6,10,10-tetramethyl- (isomer 2) are among the significant	**[20]**

		chemical ingredients that were detected using the GC-MS technique.	
6.	Future molecular medicine from white frangipani (plumeria alba. L)	This review explains the white frangipani's pharmacological and toxicological properties before outlining its outlook for molecular medicine in the future by determining the protein target based on those biological effects. It is hoped that this review would assist scientists in obtaining an overview of the many studies conducted on white frangipani and stimulate more molecular-level research on this plant.	**[21]**
7.	Active substance compounds and antibacterial activity of extract leaves of p. alba against E. coli	P. alba leaf extract's active ingredient components and antibacterial effectiveness against E. coliThis study aimed to assess the antibacterial activity and saponin and phenol active component composition of p. alba leaf extract. Based on the Folin-Ciocalteu reagent, phenol compounds were examined. The absorbance of the saponins was measured at 544 nm using a spectrophotometer; each analysis included three replications.	**[22]**
8.	Plumeria alba (white frangipani) leaf powder as a biomass - based absorbent for removal of methylene blue in water	Using powdered leaves from Plumeria alba (white frangipani) as a biomass-based adsorbent to remove methylene blue from water ABSTRACT Methylene blue (MB), a cationic dye, was employed in batch tests to adsorb onto Plumeria alba (White frangipani) leaf powder (WFLP) from aqueous solution. The adsorption of MB on WFLP was examined in relation to contact time, solution pH, adsorbent dosage, initial dye concentration, and temperature.	**[23]**
9.	Evaluation of the analgesic activity of aqueous and alcoholic extract of flowers of plumeria alba linn in experimental animals	Assessment of the Analytical Activity of Plumeria alba linn Flower Aqueous and Alcoholic Extract in Experimental Animals The analgesic properties of the alcoholic and aqueous extracts of P. alba Linn flowers were assessed in this work using acetic acid-induced writhing and hot-plate techniques.	**[24]**
10.	Plumeria alba -mediated green synthesis of silver nanoparticles exhibit antimicrobial effect and anti-oncogenic activity against glioblastomaU118 MG Cancer cell line	Green Synthesis of Silver Nanoparticles Mediated by Plumeria alba Shows Antimicrobial and Anti-Oncogenic Properties Against Glioblastoma U118 MG Cancer Cell Line The physiochemical and pharmacological characteristics of P. alba leaf extract (P-AgNPs), which is being used in current research to create silver nanoparticles (AgNPs), have been characterized in acknowledgment of its therapeutic potential as an antibacterial and anticancer agent. Ultraviolet-visible spectroscopy, Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM), X-ray diffractometry (XRD), and zeta potential analysis were used to physiochemically characterize these biogenic synthesized P-AgNPs.	**[25]**
11.	Antioxidant and antibacterial response of hydroalcoholic extract of plumeria alba leaves	Plumeria alba leaf hydroalcoholic extract's antibacterial and antioxidant propertiesThe goal of the current study was to assess Plumeria alba leaves hydroalcoholic extract's (PALHE) antibacterial and antioxidant properties. The study examined PALHE's antibacterial, antioxidant, and phytochemical screening properties.	**[26]**
12.	Chemical characterization antioxidant, antimicrobial, and antibiofilm activities of essential oils of plumeria alba	Chemical Properties, Antioxidant, Antimicrobial, and Antibiofilm Properties of Plumeria alba Essential Oils The chemical makeup and biological activity of essential oils extracted from Plumeria alba flowers and leaves were assessed in this study. The Clevenger-type apparatus was used to extract the essential oils, and GC-MS was used to describe them. A total of 17 chemicals were identified in the floral essential oil, with linalool (23.91%), geraniol (10.47%), α-terpineol (10.97%), and phenyl ethyl alcohol (8.65%) being the most abundant. A total of 24 chemicals were identified in the leaf essential oil, including benzofuran, 2,3-di, hydro- (3.24%), and muurolol (1.40%). Assays for hydrogen peroxide scavenging,	**[27]**

		phosphomolybdenum, and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging were used to evaluate antioxidant activity.	
13.	Potential antimicrobial compounds in flower extract of plumeria alba	Plumeria alba flower extract has possible antibacterial compounds Abstract The purpose of this work was to identify potential antimicrobial components using GC-MS analysis and to examine the antibacterial properties of Plumeria alba flower extract in methanol. Five fungal species (Trichoderma viride, T. reesei, T. harzianum, T. hamatum, and T. koningii) and five bacterial species (Escherichia coli, Salmonella sp., Pseudomonas sp., Bacillus sp., and Staphylococcus sp.) were used to evaluate the antimicrobial efficacy of the methanolic extract at concentrations ranging from 5 ppm to 1000 ppm.	**[28]**
14.	Antihyperglycemic activity of plumeria alba Linn. leaves extract in streptozotocin - nicotinamide induced diabetic rats	Plumeria alba Linn. Leaf Extracts' Antihyperglycemic Properties in Streptozotocin-Nicotinamide-Induced Diabetic Rats However, the leaves of Plumeria alba Linn. have not yet been shown to have an antihyperglycemic effect. The hypoglycemic action of Plumeria alba leaf extracts in ethanol and water was examined using a Streptozotocin-nicotinamide-induced Type II diabetes model and contrasted with the diabetic control group. Albino Wistar rats were used to test for anti-diabetic properties. For 21 days, ethanolic and aqueous leaf extracts at 250 mg/kg b.w. and 500 mg/kg b.w. were administered to both normal and experimental rats, and the impact on blood sugar levels was assessed.	**[29]**
15.	Essential oils of plumeria alba L. and rubra L. growing in Egypt: GC/MS analysis, molecular dynamic and in-vitro anti-cholinesterase activity	Plumeria alba L. and Plumeria rubra L. essential oils cultivated in Egypt: Molecular dynamics, GC/MS analysis, and in vitro anti-cholinesterase activity Plumeria species' essential oils (EOs) are useful components for use in medicine, cosmetics, and fragrance because of their remarkable chemical compositions and wide range of biological activity. Examining the chemical profiles of P. alba L. and P. rubra L., which are grown in Egypt as biologically active crops, is our goal.	**[30]**

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