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Review

VELIPARUTHI (PERGULARIA DAEMIA): A COMPREHENSIVE REVIEW ON BOTANICAL CHARACTERISTICS, PHYTOCHEMICAL CONSTITUENTS, TRADITIONAL USES, AND PHARMACOLOGICAL ACTIVITIES

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	Abstract
Published on: 04.03.2026	The present investigation focuses on the phytochemical analysis and therapeutic potential of Pergularia daemia. Traditionally, this medicinal plant has been used for its laxative, antipyretic, and expectorant properties, as well as in the treatment of infantile diarrhea and malarial fever. The study includes preliminary phytochemical screening followed by an evaluation of antibacterial activity. Phytochemical analysis revealed the presence of tannins, saponins, flavonoids, quinones, phenolic compounds, alkaloids, steroids, and glycosides. Among the various solvent extracts, the hydroalcoholic leaf extract of Pergularia daemia showed a higher concentration of these bioactive constituents. Antimicrobial activity was observed against both gram-positive and gram-negative bacteria, indicating the potential effectiveness of the plant extract.
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	Keywords: Pergularia daemia, laxative, antipyretic, expectorant

INTRODUCTION

Medicinal plants are considered one of nature's greatest assets. India alone is estimated to possess more than 45,000 plant species with therapeutic value. These plants exhibit a wide range of properties, including antioxidant, anti-inflammatory, and anticancer activities. Despite their abundance, only about 60% are formally employed by

medical practitioners, while the remaining 40% are used in traditional medicine systems [1].

Pergularia daemia is one such traditionally valued ethnomedicinal plant known for its use in treating various health conditions. It is a perennial, twining herb with a pungent odor and latex, belonging to the family Asclepiadaceae [2]. The seeds, covered with silky hairs,

are dispersed by wind due to their cotton-like texture, which is why the plant is commonly found along

roadsides in tropical and subtropical areas, forming natural hedges [3].



Figure:1 VELIPARUTHI (*Pergularia daemia*)

The plant is widely recognized by the name “Veliparuthi” in Tamil and “Hariknot” in English. In Tamil, “Veli” refers to a guardian or protector. Interestingly, Siddha medicine identifies only two plants as protective shields for humans: Veliparuthi (*Pergularia daemia*) and Kodiveli (*Plumbago zeylanica*), due to their broad medicinal significance. *Pergularia daemia* is used as an antihelminthic, laxative, antipyretic, and anti-inflammatory agent [4]. Its aerial parts possess hepatoprotective [5] and antidiabetic properties [6]. The leaf latex is traditionally applied to relieve pain and toothache [7], while the dried leaves are used in managing bronchitis, asthma, rheumatic fever, amenorrhea, and dysmenorrhea [8].

The current study focuses on comparing the qualitative and quantitative phytochemicals present in *Pergularia daemia* leaves extracted using different solvents, and on identifying the bioactive constituents through high-performance liquid chromatography (HPLC). [9]

BOTANICAL DESCRIPTION

Pergularia daemia is a foul-smelling, perennial climbing herb widely distributed in tropical and subtropical regions. [10] The stem contains milky latex and is densely covered with fine hairs measuring approximately 1 mm in length [11]. The leaves are thin, softly pubescent, and vary in shape from ovate to cordate, which is a characteristic feature of the species

[12]. The flowers are produced in the leaf axils and possess a distinctive double white corona at the base of the staminal column [13]. They are borne on elongated peduncles arranged in umbel-like or corymblike clusters and are often lightly tinged with purple [14].

The fruit occurs as paired follicles measuring about 5.8 cm in length and 1 cm in diameter, curved backward with a prominent beak and covered with soft spiny projections [15]. Upon maturation, the follicles dehisce to release numerous seeds bearing long white hairs; the seeds are densely velvety on both surfaces, facilitating effective wind dispersal. All parts of the plant are traditionally used for medicinal purposes, emphasizing its ethnopharmacological significance. [16]

CULTIVATION OF VELIPARUTHI (*PERGULARIA DAEMIA*)

Veliparuthi (*Pergularia daemia* (Forssk.) Chiov.) is a perennial twining medicinal herb belonging to the family Apocynaceae (Asclepiadaceae) [17]. The plant is widely distributed as a wild species throughout the tropical and subtropical regions of India, where it commonly grows along fences, wastelands, and field margins [18]. Although it occurs naturally, organized cultivation has recently gained importance due to the increasing demand for its medicinal and pharmacological applications [19].

Veliparuthi exhibits strong adaptability to drought conditions and grows well in warm tropical climates. It can thrive in semi-arid regions and prefers moderate rainfall, while optimum growth is observed under full sunlight exposure⁽²⁰⁾. The plant can tolerate a wide range of soil types; however, well-drained sandy loam to red loamy soils enriched with organic matter are considered most suitable for healthy growth.⁽²¹⁾ A slightly alkaline to neutral soil pH has been reported to favor vigorous vegetative development and biomass accumulation⁽²²⁾.

The plant is commonly propagated through both seeds and vegetative methods⁽²³⁾. Mature seeds collected from dried follicles are directly sown in nursery beds or polybags, and germination generally occurs within 7–14 days under favorable environmental conditions⁽²⁴⁾. Vegetative propagation using stem cuttings containing two to three nodes is preferred over seed propagation, as it ensures better establishment, uniform growth, and faster development of plants⁽²⁵⁾.

For successful cultivation, the land is plowed two to three times to obtain fine tilth, which improves soil

aeration and root penetration⁽²⁶⁾. Organic manure, particularly farmyard manure (FYM), is incorporated during land preparation to enhance soil fertility and microbial activity.⁽²⁷⁾ Seedlings or rooted stem cuttings are transplanted at appropriate spacing to allow adequate spreading of the climber and to promote better growth and biomass production⁽²⁸⁾.

Veliparuthi requires minimal irrigation once established. Initial watering is necessary for proper establishment of seedlings, after which irrigation frequency can be reduced. Excessive watering should be avoided, as waterlogging may result in root rot and poor plant growth.⁽²⁹⁾ In most cases, the application of organic manure alone is sufficient to meet the nutritional requirements of the plant, and excessive use of chemical fertilizers is discouraged, especially when cultivated for medicinal purposes. Regular weeding during early growth stages and the provision of support structures such as trellises or fences enhance plant growth and biomass production, while the plant generally shows resistance to major pests and diseases⁽³⁰⁾.



Figure:2 Pests And Diseases

Harvesting

Veliparuthi (*Pergularia daemia*) is generally harvested six to eight months after sowing, depending on the intended therapeutic use. For medicinal purposes, the entire plant, including leaves, stems, and roots, is collected.⁽³¹⁾ Harvesting during the flowering stage is preferred, as studies indicate that the concentration of bioactive phytochemicals is relatively higher during this period, ensuring maximum therapeutic efficacy.⁽³²⁾

Post-Harvest Handling

To preserve its medicinal properties, the harvested plant material should be thoroughly cleaned to remove soil and impurities, followed by shade drying under ambient conditions. Proper drying helps prevent degradation of active constituents.⁽³³⁾ The dried material should be stored in airtight containers to protect it from moisture, light, and microbial contamination, thereby maintaining its therapeutic

quality for extended periods.⁽³⁴⁾

METHODOLOGY

The present review on *Pergularia daemia* was conducted through a systematic analysis of existing literature. Information regarding botanical description, traditional uses, phytochemical constituents, and pharmacological activities was compiled from standard pharmacognosy textbooks, classical Ayurvedic and

Siddha literature, and published research articles.⁽³⁵⁾ Peerreviewed journals and authenticated scientific databases were consulted to ensure accuracy and reliability of the data. Ethnobotanical information was collected from documented folk medicinal practices to understand traditional therapeutic applications. The collected data were critically analyzed, organized, and paraphrased to provide a concise and original overview of the medicinal importance of the plant.⁽³⁶⁾

MATERIALS AND METHODS

Collection Of Plant Material:

The whole plant of *Pergularia daemia* was collected from Karuppur, Salem district, Tamil Nadu, India. The collected specimen was authenticated and a voucher

specimen was deposited in the Herbarium of the Department of Botany, University of Madras, Chennai, with the authentication number **MUCASB-H106**, ensuring taxonomical correctness of the study material.⁽³⁷⁾

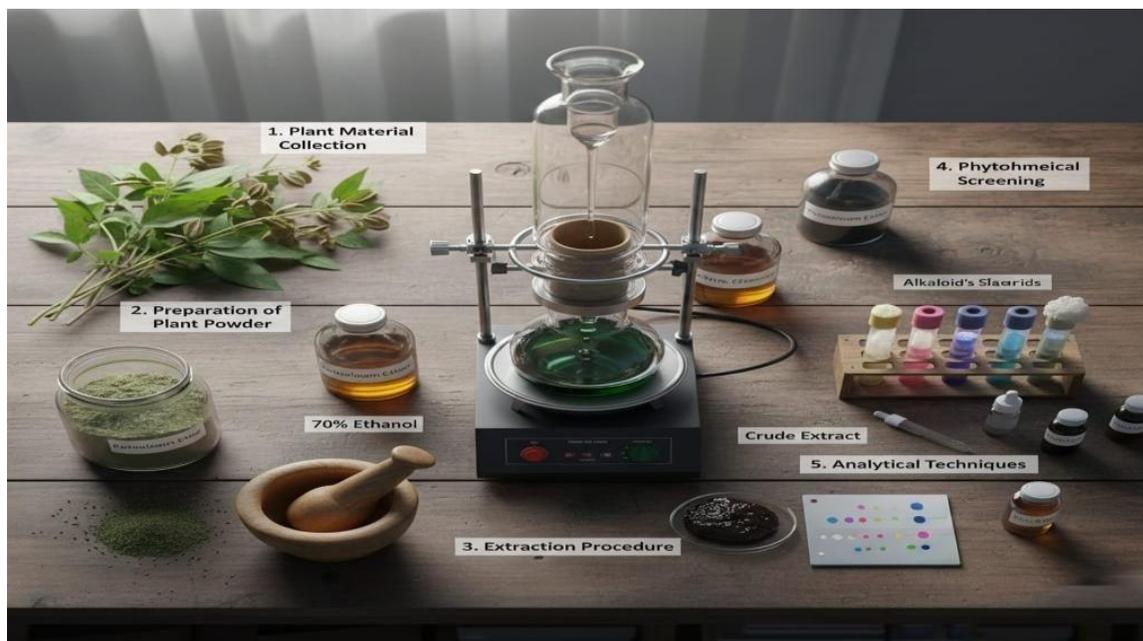


Figure:3 MATERIALS AND METHODS

Making the extract:

After being removed from the entire plant, the aerial portion—which included the leaves, stem, and flowers—was cleaned with water to get rid of the sand and dust. After being allowed to dry at room temperature in the shade, it was ground into a powder using an electric

blender.⁽³⁸⁾ A fine powder was then obtained by sieving this powder. The fine powder was then treated repeatedly with 95% ethanol in a soxhlet apparatus while being continuously heated for 72 hours to create the ethanol extract.⁽³⁹⁾



Figure:4 Veliparuthi Extract

Phytochemical Analysis

The ethanolic extract of *Pergularia daemia* was qualitatively analyzed to detect the presence of various bioactive phytochemical constituents using standard phytochemical screening procedures. ⁽⁴⁰⁾

Test for Flavonoids:

One milliliter of the extract was treated with a few drops of 1% ammonia solution. The appearance of an intense yellow coloration indicated the presence of flavonoid compounds in the extract ⁽⁴¹⁾.

Test for Tannins:

Two milliliters of 5% ferric chloride (FeCl_3) solution were added to one milliliter of the extract. The formation of a blue-black precipitate confirmed the presence of tannins ⁽⁴²⁾.

Test for Alkaloids:

The extract (1 ml) was acidified with 2 ml of 2N hydrochloric acid and subsequently treated with Mayer's reagent (potassium mercuric iodide solution). The appearance of a white, turbid precipitate indicated the presence of alkaloids ⁽⁴³⁾.

Test for Glycosides:

One milliliter of concentrated sulfuric acid (H_2SO_4) was added to one milliliter of the extract, followed by hydrolysis and treatment with Fehling's solution. The formation of a black-red precipitate confirmed the presence of glycosides ⁽⁴⁴⁾

Test for Terpenoids:

One milliliter of the extract was mixed with one milliliter of concentrated sulfuric acid. After hydrolysis, the addition of Fehling's solution resulted in the formation of a black-red precipitate, indicating the presence of terpenoid compounds. ⁽⁴⁵⁾

Test for Steroids:

Two milliliters of the extract were dissolved in chloroform and carefully layered with two milliliters of concentrated sulfuric acid along the sides of the test tube. The development of a red upper layer and a yellow sulfuric acid layer with green fluorescence confirmed the presence of steroids ⁽⁴⁶⁾.

Test for Carbohydrates:

Benedict's reagent (5 ml) was added to one milliliter of the extract and heated for five minutes. The formation of a bluish-green color, followed by a reddish-pink coloration upon further heating, indicated the presence of carbohydrates ⁽⁴⁷⁾.

VERNACULAR NAMES

Language	Vernacular Names
Bengali	Chagulbanti, Changulbati
Gujarati	Amaradudheli, Chamardudhel
Hindi	Utranajutuka, Utran, Dudhi, Dudhibel
Kannada	Haalu koratige, Hala koratige
Malayalam	Veliparatti, Veliparuti
Marathi	Utaranavel, Uturhi
Oriya	Juktiruhi, Uttruri, Uturdi
Sanskrit	Uttaravaruni, Kurutakah, Yugaphala
Tamil	Beliparti, Nandamani, Uthamani, Veliparuthi

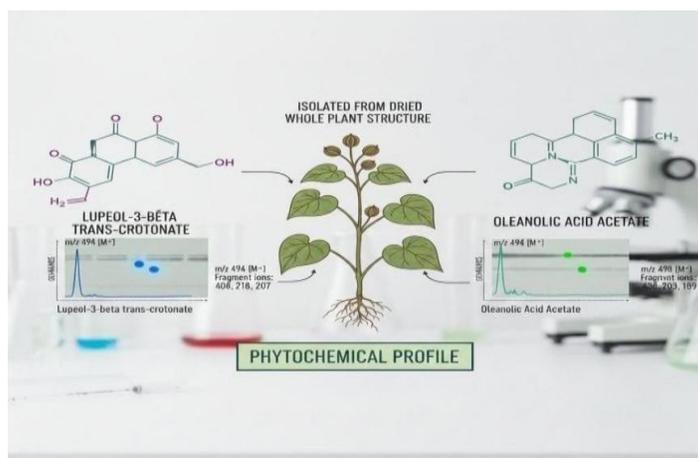
TAXONOMY CLASSIFICATION:

Kingdom :	Plantae
Subkingdom :	Tracheobionta
Super division:	Spermatophyta
Division :	Magnoliophyta

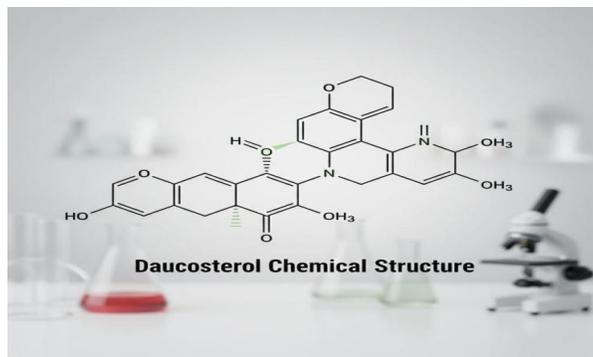
Class :	Magnoliopsida
Subclass :	Asteridae
Order :	Gentianales
Family :	Asclepiadaceae
Genus :	Pergularia
Species :	P. daemia (Forsk) Chiv.

Phytochemical profile:

Phytochemical and pharmacognostic analyses of Pergulariaemia stem. Transverse sections of the stem and powder microscopy were used to determine microscopical characteristics. A preliminary phytochemical study was performed and alcoholic and aqueous extracts were prepared. Carbohydrates, alkaloids, and flavonoids are present in alcoholic extract, while steroids and tannins are present in aqueous extract.⁽⁴⁸⁾ Alcoholic extract thin layer chromatography reveals eight spots with Rf values of 0.12, 0.8, 0.38, 0.45, 0.58, 0.74, 0.87, and 0.93, respectively. Additionally, it can be applied to the establishment of pharmacopoeial criteria and standardization. The entire plant and root were found to contain β -sitosterol, lupeol, lupeol acetate, α , β -amyrin, and its acetate⁽⁴⁹⁾.



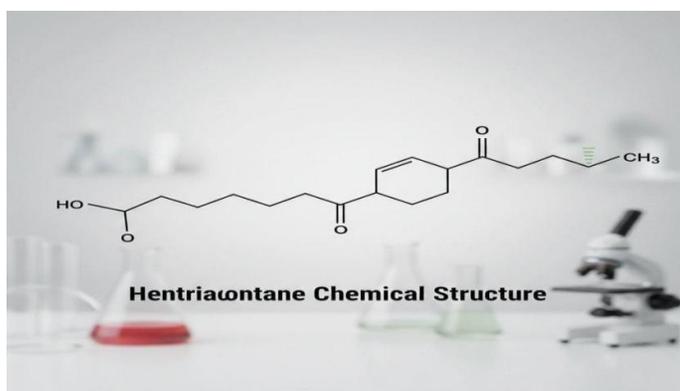
4 Isolated Lupeol-3-Beta Trans Crotonate And Oleanolic Acid Acetate From Dried Whole Plant.



Daucosterol structure

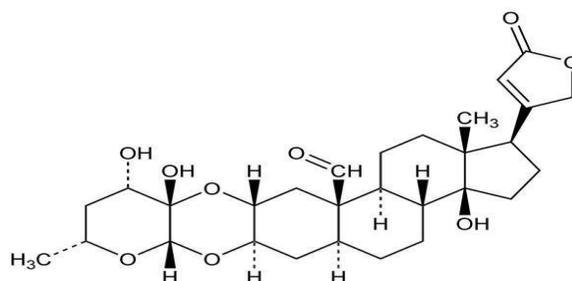
The entire plant was found to contain betaine, pentacosanoic acid, hentriacontane, magnesium and

potassium carbonate, daemia extensa polypeptide, calcium, magnesium, and potassium oxalate⁽⁵⁰⁾



Hentriacontane structure

Calotoxin, calotropagenin, uscharidin, and dihydrocalotropagenin are among the cardenolides found in seeds, whereas coroglaucigenin, corotoxigenin, uscharidin, and uzarigenin are found in stems.⁽⁵¹⁾



Calotropin structure

Uscharidin was found to contain calactin, calotropin, corotoxigenin, daucosterol, and sucrose in the root, while coroglaucigenin, corotoxigenin, uscharidin, and uzarigenin were found in the stem. The entire plant contains inorganic salts like KCl and KNO₃,

PHARMACOLOGICAL PROFILE

As a Phytomedicine:

Pergularia daemia is a plant that has long been used as an anthelmintic, laxative, antipyretic expectorant, and treatment for malarial intermittent fevers and infantile diarrhea. It is extensively dispersed over the world's tropical and subtropical climates. Terpenoids, flavonoids, sterols, and cardenolids are among the phytochemicals that have been separated and identified from the plant's leaves, stems, shoots, roots, seeds, and fruits.⁽⁵³⁾ The current review article focuses on *P.*

uscharidindaemia extensa polypeptide, and daemia extensa glucoside. Flavonoids and saponins are found in young shoots and blossoms, whereas hyperoside (flavonol) is found in dried stems.⁽⁵²⁾

daemia's therapeutic qualities, chemical components, and other significant features.⁽⁵⁴⁾

Triterpenoids and flavonoids were found in the ethanolic extract, according to their research on both aqueous and ethanolic extracts. Their findings imply that *P. daemia*'s flavonoid content may be in charge of hepatoprotection. Additionally, *Pergularia daemia*'s hepatoprotective effect was assessed in vitro. extract from iethanol. The study's findings further support the idea that flavonoids have hepatoprotective properties.⁽⁵⁵⁾



Figure:5 Pharmacological Profile

Antioxidant Activity

The antioxidant activity of *Pergularia daemia* root extract has been evaluated in vitro. Preliminary phytochemical screening of both ethanolic and aqueous extracts revealed the presence of alkaloids, glycosides, steroids, flavonoids, saponins, terpenoids, tannins, and phenolic compounds.⁽⁵⁶⁾ The results of these studies demonstrated significant antioxidant activity of *P. daemia*, which may be attributed to the presence of polyphenolic compounds and other bioactive phytochemicals.⁽⁵⁷⁾

Anticancer Activity

The anticancer potential of *Pergularia daemia* was evaluated using a panel of sixty human cancer cell lines, including subpanels representing melanoma, leukemia, lung, colon, kidney, ovarian, and central nervous system cancers.⁽⁵⁸⁾ The findings indicated that α myrin isolated from *P. daemia* exhibited low-potency anticancer activity against certain cancer cell lines, suggesting a modest cytotoxic potential.⁽⁵⁹⁾

Antidiabetic Activity

The antidiabetic effects of ethanolic and aqueous extracts of *Pergularia daemia* were investigated in alloxan-induced hyperglycemic animal models.⁽⁶⁰⁾ The extracts produced a significant reduction in blood glucose levels, restoring near-normal values at a dose of 200 mg kg⁻¹. The hypoglycemic activity is believed to be associated with the presence of flavonoids such as quercetin and phytosterols like β -sitosterol.⁽⁶¹⁾ Further studies using streptozotocin-induced diabetic rats confirmed that oral administration of significantly reduced blood glucose levels, indicating notable antidiabetic potential.⁽⁶²⁾

Antibacterial Activity

Ethyl acetate and ethanol extracts of *Pergularia daemia* demonstrated strong antibacterial activity against *Staphylococcus aureus*, *Pseudomonas*

aeruginosa, *Aeromonas hydrophila*, *Escherichia coli*, and *Salmonella typhi*.⁽⁶³⁾ Among the tested extracts, the ethanolic extract showed pronounced antibacterial efficacy, suggesting that *P. daemia* possesses promising broad-spectrum antibacterial properties.⁽⁶⁴⁾

Antiuro lithiatic Activity

The antiuro lithiatic and diuretic activities of a 50% alcoholic extract of the whole plant *Pergularia daemia* (Family: Asclepiadaceae) were evaluated using an ethylene glycol-induced urolithiasis model. Administration of ethylene glycol (0.75% in drinking water) resulted in increased renal excretion of calcium and phosphate and induced hyperoxaluria. Treatment with the plant extract significantly ($P < 0.001$) reduced elevated serum levels of urea nitrogen, creatinine, and uric acid, demonstrating its protective role against kidney stone formation.^[65]

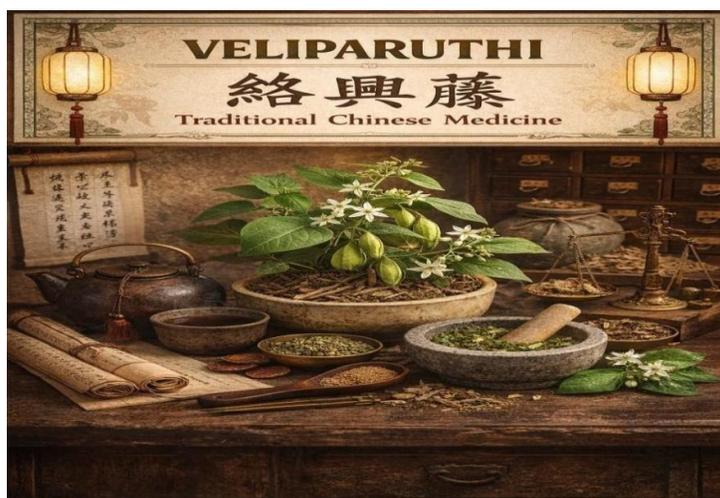


Figure:6 Traditional Chinese Medicine (Tcm)

USES OF PERGULARIA DAEMIA

- It possesses anti-inflammatory properties and is used to reduce swelling and inflammation.
- The plant is traditionally used in the treatment of fever and infections due to its antipyretic action.
- *Pergularia daemia* acts as an analgesic and helps in relieving pain.
- It shows anti-diabetic activity and is useful in controlling blood glucose levels.
- The plant is beneficial in respiratory disorders such as asthma and cough because of its expectorant effect.
- It has laxative properties, which help in improving digestion and relieving constipation.
- Traditionally, it is used as an anti-venom agent for snake bites and insect stings.
- The plant exhibits antimicrobial activity, helping to fight infections.
- It is also used in wound healing and skin-related conditions in folk medicine.⁽⁶⁶⁾

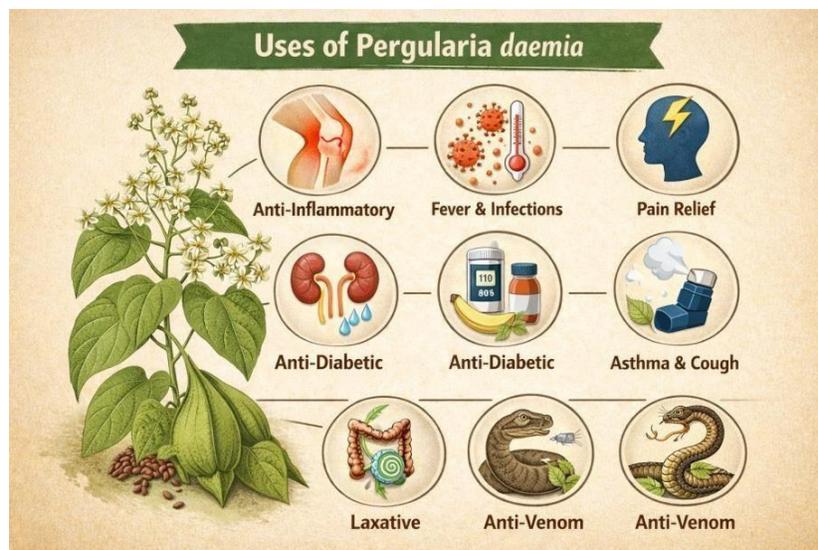


Figure:7 USES OF PERGULARIA DAEMIA

MORPHOLOGY

- A hairy, twining perennial herb.
- Opposite, widely oval, and cordate at the base are the leaves.
- Small, greenish-yellow flowers that are grouped in cymes.
- Fruits: Lanceolate-shaped folicles.
- Comose seeds are tufts of silky hairs.⁽⁶⁷⁾

INDUSTRIAL APPLICATIONS & USES

1. PHYTOCHEMICAL PRODUCTS AND HERBAL FORMULATIONS

- Veliparuthi extracts can be standardized as herbal constituents in commercial botanical products, notwithstanding their primary therapeutic use:
- Products in the herbal pharmaceutical sector that are patented or extracted are known as phytomedicines.
- Natural skin lotions, ointments, and anti-aging formulas could incorporate cosmetics' anti-inflammatory and antioxidant qualities. The biochemical profile supports these uses even if there aren't many particular documented industrial formulations yet.⁽⁶⁸⁾

- Note: *P. daemia*'s pharmacological components, which are frequently employed as bioactive ingredients in commercial botanicals, are covered in a number of review publications.

2. BIOGENIC NANOPARTICLES AND GREEN NANOTECHNOLOGY

- Recent studies have synthesized metal nanoparticles (such ZnO NPs) with industrial applications by using plant extracts as bio-reducing agents.
- These consist of: Nanoparticles of antimicrobials for use in coatings or biomedicine, Green nanomaterials for catalysis and sensing.
- For example, a study shown that green zinc oxide nanoparticles with antioxidant and anticancer properties may be created using leaf extract from *Pergularia daemia*. This suggests a path for the creation of industrial nanomaterials utilizing plant extracts as reducing agents.⁽⁶⁹⁾

3. POTENTIAL FOR FIBER AND BIOMASS

- *Pergularia daemia* is occasionally included under uses such as fiber and fodder in plant resources databases:

- Applications for fibers: the plant yields fibers that can be utilized to make traditional cordage or coarse ropes. Despite not being extensively marketed, this shows promise for the natural fiber sector going forward.
- However, mainstream scientific literature has not yet shown systematic industrial uses (such as the large-scale manufacture of textile fibers).⁽⁷⁰⁾

4. TRADITIONAL USES OF FOOD AND FEED

- Although the plant has not been extensively studied commercially, it is classified in some ethnobotanical entries with uses such as feed

or fodder in local contexts.⁽⁷¹⁾

5. BIOCHEMICAL BIOACTIVE RESOURCE

- Numerous bioactive substances, including sterols, cardenolides, terpenoids, and flavonoids, have the potential to produce industrial bioproducts like:
 - Natural preservatives and antioxidants
 - Bioactive extracts for nutraceuticals and functional meals
 - Plant protection agents or natural insecticides (speculative)
- These are typical industrial paths for plants high in phytochemicals, even though direct commercial products are not yet widely used. Similar applications are frequently suggested by reviews of related species.⁽⁷²⁾

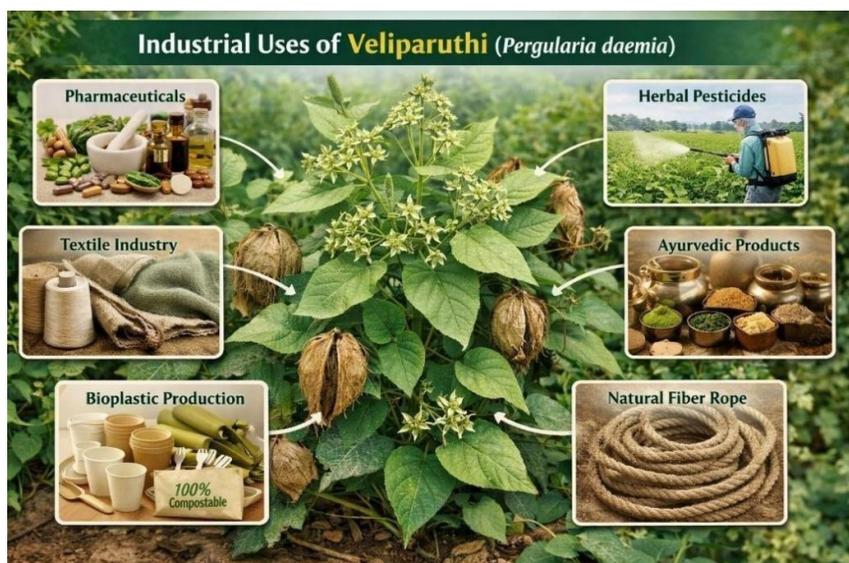


Figure: 8 INDUSTRIAL APPLICATIONS & USES

MAKING A PERGULARIA DAEMIA ETHANOLIC EXTRACT

To get rid of the sand and dust, the aerial portions—which included the stems and blossoms of the leaves—were removed and cleaned with water. It was dried in the shade at room temperature. An electric blender was used to grind the plant's dried section, and sieve was used to gather the fine powder. The powder was treated with 95% ethanol in a Soxhlet device using continuous heat extraction for 72 hours to produce the ethanol extract. Following extraction, the extract was vacuum concentrated to dryness using a rotary evaporator set at 40 °C, and the finished product was then stored.⁽⁷³⁾

DELIVERY OF DRUGS

The PD extract was dissolved in 5% tween 80 [10 gm/100 ml] to create the suspension. A pilot study was carried out to determine the PD extract's effective therapeutic dosage. PD extract was given in three different doses: 100 mg/kg, 200 mg/kg, and 300 mg/kg. It was discovered that 200 mg/kg b.w. was the lowest effective dosage of PD extract as an anti-stress agent. It was observed that the ethanolic extract [EE] and ethanol fraction [EFEE] PD extracts had a lethal dosage of 2000 mg/kg b.w. in albino rats. Our study also took into account one tenth of the highest dose of PD extract assessed for acute toxicity, which is 200 mg/kg b.w.⁽⁷⁵⁾

GROUPS OF ANIMALS

Male mature wistar albino rats in good health weighing between 150 and 170 grams were chosen. Every animal was kept in a typical laboratory. settings with a 12-hour light/dark cycle at 25 ± 2 °C and unlimited access to food and water. The Institutional Animal Ethical Committee (IAEC No. is [03/007/2014]) authorized all experimental protocols in accordance with the criteria set out by the Government of India's Committee for Purpose of Control and Supervision of Experiments on Animals (CPCSEA). Five groups of six creatures each were created from the animals.

Group I: Control group: No noise stress was applied to the animals.

Group II: Acute noise stress group-Animals were exposed to noise stress for 45 min and sacrificed immediately. These animals were used to evaluate the effect of acute noisestressinduced in all parameters

Group III: Acute noise stress with PD treated group-Animals were treated with PD extract at a dose of 200 mg/kg b.w. for 7 d, subjected to noise stress for 45 min on the 8th day and sacrificed immediately. These animals were used to determine the effect of PD extract on acute noise-stress-induced changes in all the parameters.

Group IV: PD treated exclusively for seven daysThe animals were given 200 mg/kg b.w. of PD extract exclusively for seven days, and on the eighth day, they were slaughtered. The purpose of these animals was to determine the impact of PD extract. alone across all parameters.

Group V: Vehicle control group: The animals received only 5% tween 80 treatment for seven days, and on the eighth day, they were slaughtered. The effect of the vehicle [5% tween 80] alone on all parameters was determined using these animals.⁽⁷⁶⁾

Induction Of Noise Stress

- The animals were subjected to 100 dB of pure tone noise at a frequency of 10 KHz. To obtain the pure tone noise,
- with the aid of an amplifier and a function generator. Two loudspeakers that were positioned 30 cm above the cage were linked to the amplifier. The strength of noise is measured with a sound level meter. The ventilation system caused the background noise level in the room

to be 44 ± 2 dB.

- To prevent fluctuations in the circadian cycle, all studies were conducted in the forenoon between 9 and 10 am. The Feldman and Comforti procedure [1980] was used to get the blood samples.
- In order to estimate plasma corticosterone and perform immunological procedures, 3 milliliters of blood were drawn using a heparinized syringe. The adrenal gland, lymph node, thymus, and spleen were taken out, blotted, and weighed.⁽⁷⁷⁾

EVALUATION CRITERIA INDICATORS OF STRESS MEASUREMENT OF CORTICOSTEROID LEVELS IN PLASMA

The mattingly method was used to measure plasma corticosterone. the sulfuric acidethanol reagent was used to shake free and protein-bound corticosterone after it had been extracted into dichloromethane. a fluorescent reagent was made as a result. a stock solution of corticosterone was made at a concentration of 100 mg/dl and diluted to provide concentrations between 10 and 100 µg/dl. all of the plasma samples and corticosterone standards received 7.5 milliliters of dichloromethane, and the resultant dichloromethane extract phase was thereafter moved to a tube, where it was thoroughly mixed with 2.5 ml of fluorescent reagent [concentrated sulfuric acid: 100% ethanol] .

A portion of After removing the lower phase, a spectrophotofluorometer was used to measure the fluorescence at an excitation of 470 nm and an emission of 530 nm. µg/dl of plasma was used to express the results.⁽⁷⁸⁾

Organ weight/body weight ratio of the adrenal gland and lymphoid organs Prior to the animal sacrifice,

the animal's total body weight was taken, followed by the removal, blotting, and weighing of the lymph node, spleen, thymus, and adrenal gland. By dividing the corresponding organ weight by the body weight [g] and multiplying the result by 100, the organ weight was determined.⁽⁷⁹⁾

Parameters related to immunity

Total leucocyte count [TLC] determination
Using a WBC pipette, blood was drawn up to 0.5 marks and diluted.

up to 11 markings with Turks fluid. To allow the

nucleus and granules in the cells to be stained, the pipette's bulb was slowly rotated between the palms and left for ten minutes. The cells were then counted after the diluted blood was charged in an upgraded Neubauers counting chamber.⁽⁸⁰⁾

Differential leucocyte count [DLC] determination

A perfect blood smear was made, fixed with distilled water for seven minutes, then stained with Leishman stain for two minutes. Next, the slide was

cleaned and allowed to dry. Under an oil immersion objective [100 X], the various leucocyte types—neutrophils, eosinophils, basophils, monocytes, and lymphocytes—were counted, and the results were displayed as a percentage.⁽⁸¹⁾

Adherence of neutrophils

The Srikumar et al. 2005 approach was used to measure neutrophil adherence (NA) . TLC and DLC completed, the remaining

A 15 mm long siliconeized pasteur pipette with 80 mg/ml of nylon fiber column was used to incubate the blood sample under sterile conditions. Following a short incubation time, the blood underwent further analysis for TLC and DLC. The product of TLC and the neutrophil percentage provided the blood sample's neutrophil index.⁽⁸²⁾

NI of the untreated sample minus NI of the treated sample equals neutrophil adherence = NI of the raw material × 100 The neutrophil index, or NI

The phagocytosis of Candida

The Archana et al. 2000 approach was used to assess neutrophils' phagocytic capacity. Half a milliliter of heparinized blood was developed a buffy covering after centrifugation. Heatkilled *Candida albicans* was added to this buffy coat, and it was incubated at 37 °C for 15 minutes. Ideal smears were made with the sediment and dyed with The Leishman stain.

During this period, the phagocytes begin to consume the *Candida albicans*. Under an oil immersion objective lens [100X], the swallowed *Candida albicans* were well stained and counted inside the neutrophils. The number of neutrophils that test positive for candida consumption out of 100 is known as the phagocytic index (PI). The total number of

Candida albicans found in 100 positive cells divided by 100 is the avidity index (AI).⁽⁸³⁾

Analysis of statistics

The mean±SEM was used to express the results. One-way ANOVA was used to analyze the data in SPSS version 15. The importance of

Tukey's multiple comparison tests were used to establish the groups, and p<0.05 was set as the significance level.⁽⁸⁴⁾

Corticosterone in plasma

After 45 minutes of acute noise stress, animals' plasma corticosterone levels significantly increased [p<0.001].

in contrast to the control. A 7-day pretreatment with PD extract greatly reduced the alterations brought on by acute noise stress [p<0.001].⁽⁸⁵⁾

Ratio of lymphoid organ weight to body weight

The spleen's [p<0.001] and thymus's [p<0.01] organ weight/body weight ratios significantly decreased in acute noise.

stress group in contrast to the control group. The reduction in the spleen and thymus's organ weight/body weight ratio was considerably stopped by pretreatment with PD extract. The organ weight/body weight ratio of the adrenal gland and lymph nodes did not significantly alter in any of the groups when compared to the control. There was no discernible alteration in any lymphoid organ or adrenal gland when PD extract and vehicle control were used alone.⁽⁸⁶⁾

Parameters related to immunity

Acute noise stress was significantly reduced by total leucocyte count (TLC).

[p<0.001] in contrast to the control. The TLC was dramatically raised by PD therapy [p<0.001], returning it to normal [table 2]. Vehicle control and PD extract by themselves did not significantly alter TLC.⁽⁸⁷⁾

RESULTS & DISSCUSION

Indicators of stress

Corticosterone in plasma

Animals exposed to noise stress for 45 minutes showed a highly significant increase in plasma corticosterone, which is consistent with earlier findings by

Manikandan et al. (2005) and Sembulingam et al. 1997. This results from the hypothalamic-pituitary-adrenal [HPA] axis being activated, in which the hypothalamus's corticotrophin-releasing hormone [CRH] triggers the production of adrenocorticotrophic hormone [ACTH]. The adrenal cortex releases corticosterone in response to stimulation by ACTH.

By considerably lowering plasma corticosterone levels prior to treatment with PD extract, the animal was shielded from the negative effects of noise stress.

Organ weight/body weight ratio of the adrenal gland and lymphoid organs

Acute noise stress exposure resulted in a notable drop in weight of the thymus and spleen, whereas the weight of the adrenal gland and lymph nodes remained unchanged.

Splanchnic vasoconstriction brought on by sympathetic nervous system stimulation during stress causes blood to go to the periphery, resulting in a decrease in the weight of the thymus and spleen.

Parameters related to immunity

Leucocyte count overall

Acute noise stress exposure in the current investigation resulted in a substantial drop in the total leucocyte count when compared to the control.

This aligns with the earlier findings by Sembulingam et al. This drop in TLC could be explained by the sudden increase in glucocorticoid release, which alters cell circulation. Treatment with PD extract effectively preserved TLC's normal circulation, which might be because of the negligible rise in glucocorticoid levels.

Various leucocyte counts

Eosinophils, neutrophils, and lymphocytes all significantly decreased in the differential leucocyte count, although there was no discernible

notable alteration in monocytes and basophils in the acute noise-stressed group relative to the control. The rise in plasma corticosterone levels brought on by acute noise stress exposure may also be the cause of this. Pretreatment with PD extract maintained the normal circulation of leucocytes by greatly preventing the acute noise stress-induced decrease in eosinophils, neutrophils, and lymphocytes.

Test for neutrophil adherence

The three processes of phagocytosis—margination, attachment to the organism, and destruction of the foreign organism—involve killing the organism by engulfing and releasing lysosomal enzymes from the neutrophils. It takes extremely strong adhesion for neutrophils to separate from the circulation. The quantity of β_2 integrins stored in neutrophil granules rises, and neutrophils' ability to adhere is accelerated. Acute noise stress exposure dramatically reduced neutrophil adhesion to nylon in the current investigation, which is consistent with research by Archana et al. (2013).

Pretreatment with PD extract considerably enhanced neutrophil adherence in the current investigation, suggesting that the process of neutrophil margination along the blood vessels was improved by PD extract since it stops neutrophils from internalizing β_2 integrins.

The phagocytosis of Candida

Acute noise stress-exposed animals exhibited improved candida phagocytosis phagocytic and avidity indices.

The sympathetic nervous system may regulate neutrophil response. Alpha and beta adrenergic receptors improve neutrophils. Thus, the cAMP pathway is triggered by increased sympathetic activation during noise stress, which causes the neutrophils to release lysosomal enzymes. As a result, acute noise stress exposure increases neutrophils' capacity to kill. The rise in the phagocytic index and avidity index was considerably inhibited by pretreatment with PD extract.

This highlights how PD extract can reduce stress in groups receiving treatment for acute noise stress. Hemanthkumar et al. showed that when heptane

When PD extract was tested for antibacterial activity in vitro, it demonstrated the greatest zone of inhibition against *Candida albicans* and *E. coli*.

Consequently, the findings showed that *Pergularia* ethanolic extract

The immunosuppression brought on by acute noise stress was considerably mitigated by daemia. Alkaloids, terpenoids, tannins, saponins, and other compounds were found in several PD extracts according to phytochemical investigation.

Glycosides and flavonoids. Many plants contain saponins, a class of glycosides with detergentlike qualities that are stable in both acidic and alkaline environments. These saponins have antiinflammatory, anti-oxidant, anti-apoptotic, and immunostimulant qualities. Tannins have the ability to deactivate and eliminate germs and may have antiviral, antibacterial, and adagent that fights parasites. The PD ethanolic extract was found to contain these two phytochemicals. The bioactive substances in Parkinson's disease extract that give it its immunostimulatory properties have identified with the use of gas mass spectrometry. These include 1-[+]-ascorbic acid 2,6dihexadecanoate, 2-hydroxy-methyl ester, 2-methyl-4- vinylphenol, phthalic acid di[1hexen-5-yl] ester, and methyl [Z]-5,11,14,17-eicosatetraenoate . The antistressor action of PD extract against acute noise stress may be attributed to these bioactive substances.

CONCLUSION:

As may be seen from this review, we have concentrated on ethnomedicinal applications, botanical descriptions, Pergularia daemia's phytochemistry and pharmacological profile. Numerous phytochemicals, including terpenoid, alkaloid, flavonoid, tannin, and steroid, have been identified in this plant. Numerous pharmacological characteristics, including antiinflammatory, analgesic, antipyretic, antioxidant, anticancer, antidiabetic, hepatoprotective, antibacterial, antifungal, and central nervous system depressant activity, are also displayed by the plant. It is thought that the thorough material in this review will aid researchers in learning more about this plant, and further study of P. daemia is necessary to establish new medicinal medications for humanity.

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