

A Review of Phytochemical and Pharmacological Actions on Pergularia Daemia Plant

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Abstract

The present review discusses the phytochemical and pharmacological actions of Pergularia daemia plant. The plant is a member of the family Euphorbiaceae and is widely distributed in the arid and semi-arid regions of India. The plant is rich in various phytochemicals such as flavonoids, terpenoids, and alkaloids. These compounds are responsible for the plant's medicinal properties, including anti-inflammatory, antioxidant, and anticancer activities. The review also discusses the traditional uses of the plant in Indian medicine and the need for further research to explore its potential in modern medicine.

Keywords: Pharmacology; Phytochemicals; Flavonoids; Antioxidant activity and medical plants

The pharmacological characteristics of these secondary metabolites are well known. Because it is not practical to obtain bioactive phytochemicals from all plant kinds, their sources are very limited. Additional medicine like Ayurveda and Unani usage of medicinal plants has harmless components that contain physiologically active compounds and contribute to the creation of alternative drugs. In India, along with other developed nations, the demand for herbal extracts and therapeutic herbs is steadily rising. Among the exporters, India is also one of the largest exporters of herbal medicine extracts. Various medicinal plants and their extracts are components of herbal medicine, which are complementary forms of medicine. This treatment is the most efficient and secure way to treat patients. Various plant components, including leaves, stem, roots, bark, flowers, seeds, etc., are used to directly synthesize herbal medications. Herbal preparations were often made using polyherbal

to treat gonorrhoea, asthma, and constipation. When combined with ginger or lime, fresh leaf extract demonstrated potent anti-rheumatic swelling effects. Recent findings claim that the pharmacological effect of *P. daemia*'s aerial parts can prevent a variety of illnesses (Figure 1).

Plant description

P. daemia is widespread in tropical zones and subtropical zones, especially in India, and other parts of Southeast Asia. It is frequently observed in India in hedges that have been cut down to a height of about 900 m in Southern India and 1000 m in the Himalayas. *P. daemia* is a milky sap-producing perennial twining plant. The smooth-haired stems can reach a height of 4 meters or more. The thin, heart-shaped, broadly ovate, glabrous, or ciliate-hairy leaves are 5–10 cm long, 3.8–9 cm wide, and have petioles that are 2.0 - 6.3 cm long and adolescent.

These flowers are long peduncled axillary pseudo umbels. Pendulous inflorescences debut at night. Corolla has long, fringed lobes that are creamy white or greenish in color.

Phytochemicals in *P. daemia*

The therapeutic and pharmaceutical potential of specific plants lies primarily in the isolation of secondary metabolites from extracts of medicinal and aromatic plants occasionally; people treat various disorders with crude extracts of medicinal herbs. On the other hand, it is critical to separate & recognize the bio-active substances and extracts, purify, and understand the mechanism of action of the purified component. Due to this, researchers are now concentrating on confirming historically claimed therapeutic properties as well as identifying bioactive chemicals from medicinal herbs. For the confirmation of bioactive phytochemicals, qualitative and quantitative analysis methods are crucial. Various groups of chemicals, including flavonoids, terpenoids, carbohydrates, tannins, alkaloids, glycosides,

steroids, and alkaloids are reported to be present in the qualitative phytonutrient examination of *P. daemia* extract in (Table 1). The first stage is utilizing phytochemicals in the preparation for the extraction of bioactive components from plant sources. Plant samples that are fresh or dried can be used to extract phytochemicals. The lyophilization procedure frequently retains greater phenolic compounds in plant specimens than dry powdered extraction. Compared to extraction in dry powder [4].

Because of their simplicity, effectiveness, and broad applicability, solvent liquid-liquid extractions are the continuous method most frequently employed to prepare extracts from plant materials. Recent years have seen the development of a wide range of techniques, including supercritical microwave extraction, among others, reliable-liquid extraction, hypercritical extraction, standard extraction, microwave extraction, and extraction using ultrasound. The identification of bioactive chemicals in plant extracts is frequently done using chromatographic methods. High-performance thin layer chromatography (HPTLC), gas chromatography (GC), and high-performance liquid chromatography are the most widely used analytical methods for the separation of polyphenolic substances (HPLC), Combining detection by DAD detector and mass spectrometry. Right now, this is one of the popular and, widely applied sets of procedures for separating, identifying, and quantifying phenolic chemicals. For determining a biomolecule's mass and revealing its structural details, Mass Spectrometry is a familiar and effective method. The main applications of mass spectrometry (MS) are in the quantitative and measurable examination of biological molecules (Figure 2).

This approach is in accordance with gas-phase ions that are divided according to their mass-to-charge ratios (m/z). Mass Spectroscopy is a non-

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the tissue from harm by attacking invading agents such as bacteria. Inflammation is typically a quick and self-limiting process, but when there is an aberrant pathological situation, it produces excessive ROS/RNS, which causes persistent inflammation. There is a relationship between this chronic inflammation and major inflammatory disorders such as arthritis, cancer, and neurological, metabolic, and cardiovascular conditions. To control this chronic inflammatory condition, researchers have previously created steroidal and non-steroidal anti-inflammatory medications. These medications successfully lessen the intensity of the illness, but they also have a number of negative effects. *P. daemia*, a medicinal herb, has therapeutic properties with the fewest adverse effects. Rats' paw edema is significantly reduced ($p < 0.001$) by *P. daemia* ethanolic extracts when compared to carrageenan- and cotton pellet-induced paw edema.

These extracts, at a dosage of 200 mg/kg, demonstrated a reduction in granuloma development of up to 44.18% and 19.87%, respectively. At the same concentration, other preparations, including n-butanol, benzene, and chloroform, display 16.83%, 13.96%, and 15.08%, respectively comparably, whole plant extracts of chloroform and petroleum ether are used to study carrageenan-induced paw edema in rats. The comparison between the treated chloroform extract and the control showed a highly significant ($p < 0.01$) development. By using a technique for stabilizing the membrane of human red blood cells (HRBCs), from the leaf and root of *P. daemia*, the invitro anti-inflammatory efficacy of ethanolic extracts was determined. Our research also showed that the leaves and root extracts had anti-inflammatory activity when the membrane was stabilized.

This method produced the most notable stabilization when compared to the standard medication diclofenac sodium (72.73%) at a concentration of 100 g/ml. Extracts from the *P. daemia* plant also exhibited potent analgesic properties. These extracts are being utilized in place of painkillers. Using Eddy's hot plate technique, the analgesic potency of *Pergularia daemia* aqueous and alcoholic root extracts was assessed. At a dosage of 1000 mg/kg, the effects were considerable ($p < 0.001$) [44]. *P. daemia* petroleum extract and chloroform both had similar analgesic effects at a dose of 100 mg/kg ($p < 0.01$). *P. daemia* contains a lot of flavonoids and glycosides, which may have a large analgesic and anti-inflammatory effect.

Anti-arthritis activity

In animal models, flavonoids have demonstrated efficacy in treating anti-rheumatic disease. Formononetin, quercetin, chrysoeriol, taxifolin, and naringenin are among the flavonoids found in *P. daemia* methanolic preparations. Red blood cell (8.38 ± 0.67 million/mm³) and hemoglobin (11.84 ± 0.42 g/dl) levels were dramatically raised in the methanolic extract-treated rat groups, which also successfully reduced paw inflammation. While rheumatoid factor (RF), erythrocyte sedimentation rate (ESR), white blood cells count (8.91 ± 0.38 thousands/mm³), erythrocyte sedimentation rate (7.91 ± 0.12 mm/h), and C-reactive protein (22.56 ± 0.26 mg/l) levels were considerably lower compared to the group of rats that had arthritis. According to the study results, alcoholic solution of *P. daemia* leaf and root (300 g/ml) could have a strong anti-arthritis effect. They verified using a membrane stabilization assay, and they found that leaf activity was higher (54.55%) than root activity (45.55%). Similar to this, *P. daemia* root extracts show 58.89% greater suppression than leaf extracts, which demonstrated 53.33%. In all instances, 100 g/ml of the reference medication diclofenac sodium was used to compare the results of the assays. Extracts of the *Pergularia daemia* leaf in the form of petroleum ether at 300 mg/kg lowered swelling and inflammation in the hind paws, which improved the arthritis state in arthritic rats. Further, it has been suggested that *P.*

daemia's anti-rheumatic effects may be attributed to phytochemicals like flavonoids and sterols.

Anti-cancer activity

The second-most common and dangerous cause of death around the globe is cancer. Secondary metabolites from plant extracts used in herbal treatments lessen the disease's severity while avoiding adverse effects for the treatment of cancer. A whole plant extract of methanol dichloromethane (1:1 v/v) ultsgesib0.67 mil2w -1e8ned podiseas.5(hh(19 -1.2 T

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to their anti-inflammatory, antioxidant, and other pharmacologically useful properties in humans, bioactive substances like