# A Review of the Pharmacognostic Characteristics, Phytochemical Constituents, and Pharmacological Effects of Hibiscus hirtus

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#### Abstract:

Hibiscus hirtus, also called Lesser Mallow or Hairy Rose Mallow, is a species of Hibiscus native to India and Africa. In Hinduism, it is used as a sacrifice to Kali and the god Ganesha. It is well known for its decorative appeal, but it also has some medicinal properties. Anti-microbial activity, anti-helminthic activity, wound healing property, anti-inflammatory activity, anti-bacterial activity, anti-diabetic property, and anti-solar property are some of the therapeutic qualities claimed byHibiscus hirtus. Many studies are being conducted on these plants, and some of the findings have indicated that they include phytochemicals such as alkaloids, glycosides, flavonoids, proteins, steroids, amino acids, carbohydrates, tannins, and phenolic compounds. As a result, an attempt has been made in this article to review phytochemicals and their pharmacological effects.

Keywords: Hibiscus hirtus, phytochemicals, pharmacological activity.

#### Introduction:

Since the beginning of time, medicinal herbs have been employed.Global research to confirm their efficacy has been conducted, and some of the results have led to the development of medications derived from plants. They complement all currently employed preventative approaches and play significant roles in the prevention of diseases. They also have a nearly endless potential to build intensifiers with distinct bioactive rules that we cannot combine. Medicinal plants are used in more than 90% of traditional medicine recipes or remedies.

There are over 200 species under the genus Hibiscus, and Hibiscus hirtus, which falls under the family Malvaceae, is one of the most commonly found in India. Hibiscus hirtusis also known as lesser mallow and hairy rose mallow. This plant has great ornamental value, and many medicinal properties are associated with it. It is used to treat wounds, diabetes, inflammation, etc. The phytochemical screening revealed that Hibiscus hirtuscontainsmany phytochemicals, including alkaloids, glycosides, flavonoids, proteins, steroids, amino acids, carbohydrates, tannins, and phenolic compounds. Many studies revealed that different extracts of Hibiscus hirtusshow anti-microbial activity, anti-helminthic activity, wound healing property, antiinflammatory activity, anti-bacterial activity, antidiabetic property, and anti-solar property.



Figure: 01Hibiscus hirtus

Synonyms: Hibiscus phoeniceus Cav. Hibiscus phoeniceus wild Hibiscus rosamalabarica

In both Indian traditional medicine and Chinese herbal medicine, the hibiscus plant is used for a wide range of medicinal applications. In the Indian traditional system, many parts of hibiscus were used for their medicinal properties. It is believed that the roots of Hibiscus cure ailments such as cough, hair loss, and hair greying. It is also used for hair strengthening and shining. The lathery paste resulting from the fine paste of leaves and flowers of Hibiscus is used as shampoo as well as conditioner. Hibiscus seed has high levels of phytosterol and tocopherol; both of these natural cholesterols have antioxidant and LDL cholesterol-lowering properties. A previous animal study found that hibiscus plant extract reduced rabbit atherosclerosis. In particular, when compared to rabbits fed a high cholesterol diet (HCD) alone, those given a high cholesterol diet plus Hibiscus plant extracthad decreased triglyceride, hirtus cholesterol, and low density lipoprotein levels<sup>[1]</sup>. Flowers in particular were used to regulate menstruation, treat stomach pain, and produce herbal drinks.

#### Ker Gawl

## Traditional uses: PHARMACOGNOSTIC EVALUATION:

#### **Organoleptic Evaluation:**

**Leaves:** colour: dark green; shape: simple alternative palmilobed, sometimes unlobed, broadly ovate; size: 3.5-7 x 1.5-3 cm; fracture: brittle when dry; colour: dark green (extract); odour: pungent; taste: mildly bitter; texture: roughly gritty.

**Flower:** colour: orange;shape: bisexual pedicle slender, joined below or just above the middle, stellate pubescent; size: 1-1.5 inch; taste: characteristic; odour: characteristic; Fracture: brittle when dry; EXTRACT: colour:dark green; odour: pungent; taste: mildly bitter; texture: slight greasy.

**Fruit:** colour: fresh light green, dry light yellow, or brown; Shape: capsule, globose, many seeds, cottony nature; size: 12-15; Seeds: 2-3mm; taste: characteristic taste; odour: characteristic odour; fracture: brittle when dry; EXTRACT: colour: dark green; odour: pungent; taste: mildly bitter; texture: slightly greasy.

#### **Powder Analysis:**



The powder analysis of the leaf powder revealed the following information: Starch Grains: 15.84; Phloem Fibres (Width): 20; Phloem Fibres (Length): 176.16; Calcium Oxalate Crystals (Width): 14.24; Calcium Oxalate Crystals (Length): 176.96; Type of stomata

(paracytic): minimum upper, maximum lower; stomatal number: 22-12; stomatal index: 50-48; vein islet number: 37; vein termination number: 58; palisade ratio: 1.925.





Fig: 04 Starch grains and Phloem fibers.



Figure: 05 Calcium oxalate crystals and trichomes.

# **Physical evaluation:**

Total Ash: 19.5; Water Soluble Ash: 12; Acid Insoluble Ash: 17; Alcohol Extractive: 1.2; Extract Values: Chloroform Extractive: 1; Moisture Content:  $0.25^{[3]}$ 

# **PHYTOCHEMICAL EVALUATION:**

## **Preliminary phytochemical screening:**

The plant extract of Hibiscus hirtus was subjected to qualitative analysis for the determination of various chemical constituents present in the plant extract, which showed positive results for the alkaloids, glycosides, proteins, anthocyanins, amino acids, flavonoids, saponins, carbohydrates, steroids, tannins, and phenolic compounds. Hibiscus hirtus may possess different activities such as anti-hypertensive, cytotoxicity, and anti-ageing and is a natural source of colour because the plant has a variety of phytochemical elements, which are verified by phytochemicalscreening<sup>[3-4]</sup>.

Antihypertensive:Malvaceae family members, Hibiscus plants have been used for centuries in traditional medicine to alleviate hypertension. With several active componentspresent, the most important of which are flavonoids and vitamins, hibiscus extracts show powerful antioxidant activities in vitro<sup>[5,6,7]9</sup>. According to a number of studies, phenylephrine (PE) and KCL (high K+, 80 mM) pre-contracted aortic rings relaxed in a concentration-dependent manner but had a noticeably stronger relaxing effect when compared to the alpha-1-adrenergic receptor agonist. After endothelium ablation and when atropine, 1-NAME, or methylene blue were present, HSE's calming impact against PE-induced contraction was modestly but significantly diminished. The aortic ring's responses to the endothelium-dependent and independent vasodilators acetylcholine (Ach) and sodium nitroprusside (SNP),respectively, were also enhanced by pre-treatment with HSE<sup>[10]</sup>. Flavonoids in Hibiscus hirtus plant extract may have anti-hypertensive effects <sup>[5-8]</sup>.

- Natural source of colour: According to reports, Hibiscus species, which are members of the Malvaceae family, are used as a food colourant as well as a flavouring for sauces, jellies, marmalades, and soft beverages. Hibiscus species appear to be reliable and promising sources for water-soluble natural red colourants. Natural colours that dissolve in water include anthocyanins, which are flavonoids.Because of the presence of anthocyanins, aqueous extracts of Hibiscus calyces have a characteristic strong red coloration, which could be used as a colouring agent in medicinal goods <sup>[9]</sup>. Because phytochemical screening revealed the presence of anthocyanin and flavonoids, there is a possibility of these activities in Hibiscus hirtus.
- Anti-ageing: Skin ageing is a complex biological process that is influenced by both inherent and external causes. Extrinsic stimuli that activate collagenase, elastase, and hyaluronidase include free radicals. Plant-based natural products have been employed as antioxidants and anti-ageing agents. Aside from metal ion chelation, processes like enzyme inhibition have no effect on the extraordinarily stable free radical known as DPPH. A different investigation revealed that flavonoids can inhibit lipid peroxidation by scavenging the DPPH radical in a dose-dependent manner <sup>[10]</sup>. As a

result of the presence of flavonoids, Hibiscus hirtus may have anti-ageing properties.

# • Quantitative phytochemical screening:

The total phenolic compounds, whole flavonoids, and anthocyanins in the plant's ethanol extract were examined, and the results were expressed as mean $\pm$  standard deviation. The ethanolic extract contains phenolic compounds (7.40  $\pm$  0.50 mg/g), total flavonoids (3.50  $\pm$ 0.85 mg/g), and anthocyanins (18.53  $\pm$  1.10 mg/g)<sup>[4]</sup>.

# **PHARMCOLOGICAL EFFECT:**

According to the recent studies, it was revealed that the plant extract of Hibiscus hirtushas a wide range of pharmacological activities, and further investigation is going on with the extract of Hibiscus hirtus. Methanolic extract has anti-solar activity, while whole-plant ethanolic extract has wound-healing properties.

# Wound healing activity:

Cuts, scrapes, scratches, and punctured skin are examples of wounds, which are physical injuries that damage the skin or other body tissues. The maintenance of the skin's barrier function as well as the preservation of all other skin functions depend on the complex, strictly regulated process of wound healing. Numerous modifying and non-modifying elements [11] can have an impact on this process. Authors mostly focus on excision, incision, and burn wound models because wound healing occurs in various sections of the human body. To gauge the speed of wound contraction, and healing, tensile strength, epithelialization, hexosamine, and hydroxyproline content were utilised. Analgesics such as ibuprofen and acetaminophen, antiseptics, antibiotics, and medicated dressings are the various medications used in treating wounds. Hydrogels, sponges, creams, peptides, and composite nanofibers are widely used in wound healing as the first line of defence. In the Indian traditional system of medicine, many medicinal plants were used for their wound-healing properties. As Hibiscus hirtus contains active constituents like flavonoids, tannins, phenolic compounds, and anthocyanins, the authors investigated the wound healing activity of this plant. The Hibiscus hirtusextract containing ointment were prepared in two concentrations (10% and 20% w/w). 10% w/w ointment consists of 2.5g of ethanolic extract of whole Hibiscus hirtus and 22.5g of ointment base (1.5g of beeswax and 21.0g of white soft paraffin), and 20% w/w ointment consists of 5g of ethonolic extract of whole Hibiscus hirtusand 20g of ointment base. On the excision model, burn model, and incision model, the 10% and 20% w/w considerably extract-containing ointments outperformed the negative control group in terms of their ability to constrict wounds. From the third day on, there was noticeable wound healing that was similar to that of the standard drug (povidone iodine ointment). The tensile strength of the incision wound model was assessed by carefully and gradually inserting standardweights into the S-shaped hook. The weight was transferred to the wound's side and gradually increased, pulling the margins of the wound apart. The weight was stopped as soon as the wound had been exposed. The 10% extract group had the highest tensile strength (15.450.15) g, while the 20% extract group had the highest tensile strength (17.690.20) g, which was virtually equal to the povidone iodine ointment treatment group (20.430.05) g. Both strengths of Hibiscus hirtusethanolic extract, 20% extract ointment (which provided 100% wound contraction in 16.240.21 days) and 10% extract ointment (which provided 100% wound closure in 20.80.23 days), demonstrated significant wound healing activity in the excision wound model. In the burn wound model, the percentage of wound contraction increased with a 20% dose of Hibiscus hirtus, and 100% wound contraction was observed in 14.40.89 days. On the sixth day, a 10% dose of Hibiscus hirtus began to dramatically diminish the wound, and it was entirely healed in 18.7 +0.22 days. The researchers looked for hydroxyproline, a key component of collagen, in the healed incision. These are helpful indications of wound healing activity. Hibiscus hirtus treatment groups experienced a statistically significant increase in hydroxyproline content as compared to negative control groups<sup>[4]</sup>.

# Antisolar Activity:

As the days pass, the sun's corrosive radiation increases dramatically, causing skin damage. UV radiation has a wide spectrum of effects, from moderate to chronic. Moderate radiation side effects include skin reddening, sunburns, skin darkening, and the development of skin patches. Giddiness and fainting, sunstroke in youngsters and the elderly, increased melanin content in the body, dehydration resulting in nutrient loss and shortage, immunosuppression, eye damage, and Alzheimer's disease are among the chronic effects. So as a remedy. many sun-protective agents are widely used. Few single chemical compounds have UV absorption across the entire spectrum. A product must possess this quality in order to be classified as an appropriate wide-spectrum sunscreen. Plant extracts typically cover the entire spectrum of UV wavelengths since they contain a large variety of natural components <sup>[13]</sup>.Plants are abundant in phenolic and flavonoid chemicals, and their extracts are frequently employed as sunscreen. The sun protection factor was computed due to the high flavonoid and phenol content of Hibiscus hirtus extracts. How long skin may be exposed to the sun before burning is determined by the sun protection factor. Using a UVvisible spectrophotometer, the absorbance of methanol extract at various wavelengths between 290 and 310 nm was determined. According to the study, Hibiscus hirtus Linn's methanol extract has the ability to absorb UV light. The greatest absorption, according to the results, is at 290 nm (0.268). According to the study, Hibiscus hirtus methanol extract exhibits the highest UVB (290-320 nm) absorption at its peak <sup>[12]</sup>. Due to its antisolar activity, it can be used in antisolar formulations and is cheap.According to various studies, flavonoids are capable of eliminating superoxide anions, singlet

oxygen, hydroxyl radicals, and lipid peroxyl radicals from the body. Flavonoids have been shown to inhibit many enzymes, including lipoxygenase, cyclooxygenase, monooxygenase, xantinoxidase, mitochondrial succinate dehydrogenase, NADHoxidase, phospholipase A2, protein kinase, and nuclear transcription factor.It is assumed that phenols can protect DNA from damage by interfering with redoxsensitive signalling cascades. Although some phenolics have beneficial benefits, they have also been proven to be mutagenic in vitro. The prooxidant rather than antioxidant characteristics of these drugs are thought to be responsible for these negative sequences. As a result, before utilising them on humans, it is critical to research their negative repercussions.<sup>[13]</sup>

# Antimicrobial activity:

A substance that kills or prevents the growth of germs like bacteria, fungus, or viruses is known as an antimicrobial. Antimicrobial medications either eradicate microorganisms or stop them from proliferating. Plants have developed the capacity to create chemical compounds that aid in their defence against a number of enemies, including insects and fungi<sup>[14]</sup>. Due to the existence of active ingredients in many plants, these plants are commonly employed for their anti-bacterial capabilities.SinceHibiscus hirtus plant extract also contains active ingredients, the scientists conducted an anti-microbial study on these plants. The hibiscus hirtusethanolic extracts were used to incubate cylindrical cups with varying dosages of antimicrobial activity, and the cup plate method was used to measure the widths of the zones of inhibition surrounding the cups. According to the investigations, Hibiscus hirtus whole plant extract exhibits growthinhibiting effects on all of the species studied; however, the effectiveness of these effects varied depending on the organism. The diameter of the Hibiscus hirtus inhibition varied from 12.4 to 18.3mm.Escherichia coli (18.6±0.33) was most sensitive to Hibiscus hirtus, followed by Proteus mirabilis (18.3 ±0.33mm), Bacillus subtilis (18.0±0.57mm), Pseudomonas putida (17.6±0.57),Klebesiella (17.0±0.57), pneumonia Staphylococcus aureus (16.6)±0.33mm), Staphylococcus werneri(16.3±0.33mm), Pseudomonas aerugenosa (16.3±0.67mm)and Candida albicans(14.2±0.12mm).Escherichia coli, a gramnegative bacterium, was found to be inhibited by an ethanolic extract of Hibiscus hirtus at a minimum concentration of 125 mg/ml<sup>[4]</sup>.

## **Antihelminthic Activity:**

Even though infections are widely disseminated, heminthic infections are the most frequent. 1.5 billion People worldwide, or 24% of the population, were affected by helminth illnesses spread via soil. The human intestine is home to nematodes such as flukes, tapeworms, and parasites. Many of these parasites have evolved antibiotic resistance in the past few decades. These helminths make people susceptible to other bacterial and fungal illnesses in addition to infecting them. Numerous therapeutic plants, including Hibiscus hirtus, are being researched for their ability to fight helminths. The methonolic extract of the crude medicine was tested for its anti-helminthic action against the Indian earthworm, Pheretimaposthuma, at two different concentrations (10 mg/ml and 20 mg/ml using 1% Tween80 as a suspending agent). According to the study, the worm Pheretimaposthuma paralysed at 114 minutes and died at 148 minutes at a concentration of 10mg/ml, but paralysed at 90 minutes and died at 120 minutes at a concentration of 20mg/ml. In contrast, the standard drug albendazole causes paralysis within 45 minutes and death within 68.5 minutes. According to the results, the 20 mg/ml concentration of the methanolic extract has more anti-helminthic activity than the 10 mg/ml concentration. The study proved that the methanolic extract of Hibiscus hirtus leaves has antihelminthic activity<sup>[15]</sup>.

# Anti-inflammatory:

Hibiscus hirtus anti-inflammatory properties were investigated and contrasted with those of ibuprofen, a common medication. Two medications-ethanolic concentration of leaves (2.5-15mg/ml) and ibuprofen (2.5-15 mg/ml)-were employed and compared to control groups using a plethysmometer to measure paw edema. In the selected model of inflammation, such as the chronic type of inflammation caused by formalin, Hibiscus hirtus L showed a significant reduction in paw edema. The right hind paw of the rat was given a subplantar injection of a 2% solution of formalin to cause chronic inflammation. Plant leaf ethanolic concentration has shown anti-microbial and antiinflammatory effects. For the length of the trial, measurements of paw volume, swelling that could be seen with the naked eye, and redness were made every 7 days. The plethysmometer was used to measure the paw volume. The study finds that the anti-inflammatory properties of Hibiscus hirtus may also be caused by the presence of flavonoids [16]. The ethanolic extract of Hibiscus hirtus at 500 mg/kg considerably decreased the paw volume.

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