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A COMPREHENSIVE REVIEW: HOLARRHENA PUBESCENS

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ABSTRACT

Kurchi, or *Holarrhena pubescens*, is a herb that contains bioactive substances such glycosides, alkaloids, tannins, and flavonoids.Medicinal plants are used to treat a wide range of illnesses and are essential to human health care. The Apocynaceae family includes the genus *Holarrhena*, which is primarily found in tropical Africa, southern continental Asia, and Sri Lanka. Historically, many *Holarrhena* species have been used to treat a variety of illnesses, including hallucinations, fatigue, skin issues, leprosy, biliousness, and diarrhea. Crucially, the bark and its preparations have long been utilized for their medicinal qualities in traditional medicine across the globe. Its antidiarrheal, antimalarial, hepatoprotective, antioxidant, anti-inflammatory, anticancer, anti-wound-healing, and anti-diabetic properties have all been shown in studies. Additionally, it decreases intestinal motility and reducing the frequency and intensity of diarrhea by promoting the passage of fluids and electrolytes. Strong anti-plasmodial efficacy against Plasmodium falciparum is demonstrated by its bark extract. It lowers oxidative stress and strengthens antioxidant defense.

KEYWORDS: *Holarrhena*, Antidiarrheal, anti-inflammatory, Plasmodium falciparum, Kurchi.

INTRODUCTION

Publicescens Holarrhena A synonym A significant medicinal plant found in tropical and subtropical parts of Asia and Africa is *Holarrhena* antidysenterica. This Indian medicinal tree can reach a height of 30 to 40 feet and a girth of 4 feet. Native to the tropical Himalaya and Assam, this tree is widely found in Indian and Pakistani jungles and is commonly used in Indian medicine to cure conditions like amoebic growths, diarrhea, and bleeding piles. irritable bowel

syndrome, liver problems, and dysentery. The flavor of the plant is bitter and astringent.[1] It is exported as a herbal dietary supplement, kutaja kwatha, kutaja prapati vati, seed powder, and bark powder. The primary application of HA seeds is as a treatment for diabetes. Numerous assessments of this plant's various medical use have been published.[2] Various gastrointestinal, skin, and diabetic conditions may benefit from its use, according to clinical and pharmacological research.[3] The stem and bark of this plant, known as kurchi, have astringent, febrifugal, digestive, antidiarrheal.[5] antidysenteric, anti-anthelmintic, stomachic, and tonic properties. Health benefits of *H. pubescens*.[1] Numerous folklore claims and the classical literature on Ayurveda likewise mention its uses.[2] It has various pharmacological actions such as anti-diabetic activity(seeds).[1] ,anti microbial activity.[2],Diuretic activity.[3] anti-inflammatory and analgesic activity(bark,seeds).[4].

Plant Profile

Biological source

Tropical and subtropical regions of Asia and Africa are home to the plant *Holarrhena antidysenterica (HA),* sometimes referred to as Kutaj, and its seeds, also known as Indrajava. India has a lot of it, particularly in the Himalayan regions.[2] The leaves are round and oblong. White, scented cylindrical stalks are the flowers. The corolla has square split edges. Fruits have white markings and are thin, terete follicles. The seeds are linear-oblong and glabrous. April through July is when it flowers, and August through October is when it bears fruit.[4]

Synonym

Holarrhena antidysenterica, *Chonemorpha antidysenterica,* and *Echites antidysentericus*, *Tellicherry* Tree, Ivory Tree, Bitter Oleander, Conessi Bark, and Kurchi, **पाांढरा कुडा** (Pāndhrā Kudā), **कुडा** (Kudā), **कुटज** (Kutaj), **इंद्रजव** (Indraja*v*)

Images

Fig. no. 1: Whole plat of *Holarrhena pubescens.*

(a) (b)

(c) (d) (e)

Fig. no. 2: Different parts of *Holarrhena pubescens*. a) Leaves b) Flowers, c) Pods or Beans, d) Seeds, e) Barks.

Fig. no 3: Powder of *Holarrhena pubescens.*

Chemical constituents

It is known that *H. pubescens* contains a number of phytochemicals. Steroid alkaloids,flavonoids, triterpenoids, phenolic acids, tannin, and resin are the main components. Ergosterol, saponins, and coumarins.[1] The stem and root barks (in toto) have the highest concentration of alkaloids, up to 4.3%, followed by the leaves (1.0–1.5%) and seeds (0.6–1.8%). Only 0.4% of the 4.3% alkaloids present in stem and root bark are accessible to flowering plants.[4]

Taxonomical classification.[1]

Kingdom – Planta

Phylum – Angiosperms

Class - Eudicots

Order - Gentianales

Family - Apocynaceae

Genus - *Holarrhena*

Species - *Holarrhena pubescens*

Botanical and geographical distribution

The plant species *Holarrhena pubescens* is a member of the Apocynaceae family, a vast group of flowering plants that has more than 5,500 species and roughly 415 genera. *Holarrhena pubescens* is a member of the genus *Holarrhena*, which includes roughly 15 species of tiny trees and shrubs indigenous to tropical parts of Asia and Africa. It is native to Bangladesh, Mozambique, Kenya, Northern Tanzania, Zare, Zambia, Zimbabwe, India, Nepal, Bhutan, Vietnam, Laos, Cambodia, Myanmar, Thailand, and South Central China. It was initially brought to Taiwan, Mauritius, Hainan, and Southeast China.

Therapeutic uses

1. Strong antioxidant properties were demonstrated by the flavonoids and phenolic substances in the aqueous and methanolic bark extract of *Holarrhena pubescens*.[4]
2. bark is often used to treat biliousness, leprosy, diarrhea, piles, and splenic disorders.[2]
3. *H. pubescens* leaves can be used to treat diabetes.[1]
4. Wistar rats' urine output was demonstrated to be considerably increased by the aqueous seed extract of *H. pubescens*.[1]
5. *H. pubescens* extract has been demonstrated to have analgesic and anti-inflammatory effects in animal models.[1]

Advantages

1. It was discovered that *H. pubescens* leaf aqueous and methanol extracts were efficient against the diarrheal pathogens.[3]
2. Strong antioxidant properties were demonstrated by the flavonoids and phenolic substances in the aqueous and methanolic bark extract of *Holarrhena pubescens.*[4]

Morphology

In West Bengal, India, *Holarrhena pubescens* is a well-known medicinal herb that is utilized in tribal folklore and ethno-traditional medicine.[4] HA is classified as a small tree or deciduous, laticiferous shrub that can grow up to 13 meters tall, 1.1 meters in diameter, and 3 to 7 meters in clear bole. It has oblong, membranous, strong, arched leaves

that measure 15–30 cm by 4–12 cm. Its base is obtuse, frequently rounded or acute, and its nerves are in 10–14 pairs, opposite, sessile, elliptic, or ovate. Its petioles can reach a length of 1.5 cm, and its cymes have a diameter of 3–6 cm.[3]

Review of literature

1. Anti-diabetic activity

The section on diabetes prevention analyzes the ways in which *Holarrhena pubescens* is used to treat diabetes in different medical systems. The plant's seeds and leaves have been found to have hypoglycemic and antihyperglycemic properties in rats, suggesting that the plant may be useful for treating diabetes in humans.[12] It emphasizes how *H. pubescens* leaves can be utilized to treat diabetes. The ethanolic extract of the seeds successfully reduced diabetes in rats at a dose of 300 mg/kg. When given the plant's leaf ethanolic extract for 21 days in a row at a certain body weight dosage, diabetic rats demonstrated notable enhancement. Studies have shown that the seeds and leaves of *H. pubescens* have both anti-hyperglycemic and hypoglycemic properties in rats, indicating a potential medicinal value for the treatment of diabetes in humans, while more study is required to demonstrate its safety and efficacy in humans.[5]

2. Anti-Microbial Activity

When tested against enteropathogenic Escherichia coli, the ethanol extracts of H. pubescens seeds shown antibacterial action. The *H. pubescens* bark petroleum ether extract also showed E. coli inhibition. In contrast to other plant species, it displayed a modest level of activity.[1] The main alkaloid that has been shown to have antibacterial properties is conessine. Whether the antibacterial activity of this plant is caused by a single alkaloid or by a combination of alkaloids has not yet been established. The results showed that all of the extracts had dose-dependent action that was similar to the conventional antifungal antibiotic fluconazole.[3]

3. Diuretic property

The aqueous seed extract of *H. pubescens* was found to significantly boost the urine production of Wister rats.The extraction of sodium and potassium ions increased. An extract of chloroform has been observed. Urine output is enhanced by *H. pubescens* in a dose-dependent manner. Urine was found to have elevated Na and K levels that indicated diuretic effect is brought on by an increase in electrolyte excretion.[5]

4. Anti-inflammatory and Analgesic Activity

Rat paw edema caused by carrageenan was inhibited by a methanolic leaf extract of *Holarrhena antidysenterica*. Furthermore, via increasing tail flick latency, the methanolic extract of *Holarrhena antidysenterica* showed an analgesic effect and inhibited the acetic acid-induced writhing response in a dose-dependent manner. By reducing the albino mice's writhing reaction, an ethanolic extract of *H. antidysenterica* demonstrated analgesic effects.[6]

5. Anti-diarrheal property

Rat diarrhea has been shown to be reduced by its seed ethanol extract. Rats that eat the H. pubescens seed ethanol extract experience significantly less diarrhea.[12] Enteropathogenic Escherichia coli-induced diarrhea is successfully inhibited by alkaloids that are isolated from *H. pubescens* seeds. Studies using phytochemistry verify the existence of flavonoids and the seeds' alkaloids, which enhance their antidiarrheal properties. Additionally, it has been shown that methanol and aqueous extracts of *H. pubescens* leaves are beneficial against illnesses that cause diarrhea.[5]

6. Anti-malarial activity

Chloroform extracts of *H pubescens* were investigated for anti-malarial efficacy against Plasmodium falciparum and administered to Swiss mice infected with isolates of Plasmodium falciparum. Bark from Pubescens showed strong anti-malarial action both in vitro and in vivo Ethanol and methanol extracts had strong antiplasmodial activity against Plasmodium falciparum, according to Nondo. The fractions extracted from the roots of *H. pubescens* were also highlyefficient against P. falciparum, which is resistant to artemisinin and chloroquine. In a separate study, the steroidal alkaloid conessine, which was extracted from *H. pubescens* bark, showed anti- plasmodial efficacy.[1] examined the antimalarial activity of Holarrhena tropical stem bark and the compound lupeol, an ester of long-chain fatty acids. Results verified that Holarrhena tropical stem bark extracts at 1.02–18.53 μg/ml showed inhibitory effectiveness against drug-resistant Plasmodium falciparum strains.[1]

7. CNS-Stimulant Activity[1]

In a study on alkaloids isolated from H. pubescens, the CNS stimulating activity of five alkaloids — conimine, isoconessimine, conessine, conarrhimine and conessimine was examined. Conessimine was the most active substance this study suggests that these alkaloids could be used to treat neurological conditions. A methanolic bark extract dramatically decreased grip strength and motor activity in another study employing Swiss albino mice, indicating a CNS depressive effect.

Phytochemical evaluation of *Holarrhena pubescens*[20]

Table no: 1 Preliminary phytochemical analysis of crude plant extract of *Holarrhena pubescens.*

Plant constituent	Stem bark			Leaf		
	Petroleum ether	Chloroform	Ethanol	Petroleum ether	Chloroform	Ethanol
Alkaloids	-	+	+	-	+	+
Flavonoids	-	-	+	-	+	+
Triterpenoids	-	-	-	-	-	-
Sterol	+	+	+	+	+	+
Quinine	+	+	+	-	-	-
Saponins	-	-	-	-	-	-
Glycosides	-	-	-	-	-	-

CONCLUSION

Holarrhena pubescens is a plant with a long history of usage in traditional medicine and has been discovered to have a range of pharmacological properties, according to the findings previously stated attributes. Numerous phytochemicals found in the plant, including flavonoids, glycosides, and alkaloids, regulate its medicinal properties. *H. Antidysenteric* medications are utilized as anti- inflammatory and antioxidant medications, as well as to treat a range of diseases such diarrhea and dyspepsia. This plant has unidentified chemical components that chemists can employ to create new medications for a range of other illnesses. The plants rich content of bioactive compounds, especially steroidal alkaloids like conessine, presents a strong potential for developing new, evidence -based drugs. Many valuable chemical constituents in the plant remain unidentified or unstudied. Future research aims to isolate and characterize these compounds, which could leads to synthesis of entirely novel medication for various infection and diseases.

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