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Medicinal Properties and Pharmacological Potential of Cassia Javanica Linn: A Review

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Abstract:

Medicinal plants have long been an essential part of both traditional and modern healthcare systems due to their therapeutic benefits and relatively fewer side effects. *Cassia javanica*, commonly known as the Pink Shower Tree or Java Cassia, is a member of the family Fabaceae and is widely found in tropical and subtropical regions. Traditionally, this plant has been used to treat a variety of health conditions, including skin infections, inflammation, fever, wounds, microbial infections, and digestive problems. Different parts of the plant, such as leaves, flowers, bark, pods, and seeds, are rich in bioactive compounds like flavonoids, tannins, alkaloids, anthraquinones, saponins, glycosides, steroids, and phenolic compounds. These phytochemicals are responsible for its various medicinal properties. Recent scientific studies have confirmed that *Cassia javanica* exhibits significant antimicrobial, antioxidant, anti-inflammatory, hepatoprotective, antidiabetic, and cytotoxic activities. This review aims to provide a comprehensive overview of the plant, including its botanical characteristics, traditional uses, phytochemical composition, and pharmacological activities. Overall, *Cassia javanica* shows great potential as a valuable medicinal plant for future research and drug development.

Keywords: *Cassia javanica*, phytochemistry, Pharmacological activity, Medicinal Properties, Antimicrobial activity, Bioactive compounds

Introduction

Medicinal plants have been an essential part of healthcare systems since ancient times and continue to play a significant part in modern medication. Across different cultures and civilizations, plants have been extensively used for the prevention and treatment of various conditions. Indeed today, a large proportion of the global population relies on plant-based remedies for primary healthcare [1]. Herbal drugs are considered safer, provident, and fluently available compared to synthetic medicines.

[2]. Phytochemical investigations of crude plant extracts have shown that plants contain a wide range of biologically active compounds distributed in different parts similar as leaves, bark, flowers, roots, fruits, and seeds. These compounds, usually applied to as phytochemicals, are generally on-nutritive in nature but retain significant defensive and disease-preventative properties. Plants naturally synthesize these substances as part of their Défense system against environmental stress, pathogens, and

herbivores [3]. Species of the genus *Cassia* (family Fabaceae) are broadly recognized for their medicinal significance and have been traditionally used for their laxative and purgative properties. In recent times, *Cassia* species have attracted considerable scientific attention due to their rich phytochemical profile and different pharmacological conditioning [4].

Cassia javanica is a cosmetic and medicinal tree extensively cultivated in India, Southeast Asia, and tropical countries. It is a small to medium-sized ornamental tree,

naturally reaching a height of 3 – 20 meters, characterized by widely spreading branches and seductive, grabby flowers. The plant bears compound leaves with multiple pairs of leaflets, and its inflorescence consists of numerous flowers arranged in clusters [5]. The plant is valued not only for its seductive pink flowers but also for its medicinal applications in traditional systems of medicine. colorful studies have shown that extracts of the plant retain strong antimicrobial and antioxidant properties due to the presence of secondary metabolites [6].



Fig.1 Cassia javanica Plant

Common names of Cassia javanica

Cassia javanica is widely known by some common names in different region of the world that's naturally mentioned to as pink Shower Tree, Pink Cassia, Rainbow Shower Tree, and sometimes known as the Apple Blossoms Tree due to its seductive group of pink to deep rose- coloured flowers. In India it's also known as Gulabi Amaltash, Java Cassia. The difference in common names is basically based on the colour and cosmetic appearance of its blossoms, which look like a flowery “Shower” during the blooming season [2]

Distribution of Cassia javanica

Cassia javanica is native area to South and Southeast Asia and it's naturally distributed from India to Malaysia including some regions similar as Sumatra, Indonesia, Southern China, and the Philippines due to its normal cosmetic value and adaptability to warm climates and the plant is also cultivated in tropical and tropical regions of Asia that grows well in warm, sticky surroundings and is generally planted along roadsides, gardens, and parks for ornamental purpose [2]

Taxonomical classification of Cassia javanica plant:

Taxonomic Rank		Classification
Kingdom		Plantae
Division		Angiosperms
Class		Magnoliopsida
Order		Fabales
Family		Fabaceae
Genus		Cassia L.
Species		Cassia javanica

Therapeutic Uses of *Cassia javanica*

Cassia javanica is known for several remedial properties because of the presence of bioactive compounds similar as flavonoids, tannins, alkaloids, and phenolic ingredients. Different parts of the plant have shown antioxidant, antimicrobial, antidiabetic, anti-inflammatory, and anticancer conditioning in various studies. The plant is also reported to possess laxative and antipyretic effects, which make it useful in managing constipation and fever. In traditional healthcare systems, it has also been used to treat gastrointestinal diseases, skin infections, and microbial diseases. These remedial activities indicate the eventuality of *C. javanica* as an important medicinal plant for maintaining overall health and treating several affections [7,8].

Ayurvedic Uses of *Cassia javanica*

In Ayurveda, *Cassia javanica* is valued for its medicinal importance and is used in the treatment of various diseases. Different plant parts similar as bark, leaves, pods, and seeds are utilized for their laxative, antimicrobial, and fever-reducing properties. The pods are generally used to relieve constipation and improve digestion, while the bark is included in some traditional Ayurvedic formulations for managing metabolic diseases. Leaves of the plant are also applied in certain skin infections due to their antimicrobial nature. Ayurvedic interpreters traditionally recommend the plant for

reducing body heat, perfecting digestive function, and supporting general wellness. The medicinal value of the plant is mainly associated with its rich phytochemical composition [2,9].

Traditional Uses of *Cassia javanica*

Cassia javanica has long been used in traditional drug practices across Asian countries. Original communities traditionally use the pods as a mild purgative to relieve constipation and digestive discomfort. In several folk remedies, the plant is used for reducing fever and treating common illnesses similar as cold, gastric pain, measles, and skin-related infections. In some Southeast Asian practices, different plant parts are used to manage malaria and microbial infections. The seeds are also reported to be useful as a source of natural gum, whereas the bark and leaves are valued for their medicinal properties. These traditional operations highlight the artistic and ethnomedicinal significance of the plant [5].

Chemical components of *Cassia javanica*

Cassia javanica Linn. is a plant well-known for its medicinal properties and historically used to several contagious disease. colorful phytochemical studies have shown that this plant is rich in bioactive secondary metabolites, which are essential for its antimicrobial, antioxidant, anticancer, antimycotic, hypoglycaemic, and haemolytic

properties. Below is an overview of the crucial bioactive components of *Cassia javanica* that may be significant for its antimicrobial characteristics.

Alkaloids: Alkaloids are those composites that contain nitrogen and are well-known for their natural properties, including antimicrobial and antioxidant effects. A qualitative phytochemical screening revealed the presence of alkaloids in the methanolic extract of the stem of *Cassia javanica*. Also, alkaloids have also been found in both the crude and ethyl acetate fractions. These compounds work against microbes by disrupting the processes of DNA replication and protein synthesis in microorganisms. They interfere with crucial enzyme exertion for the growth and survival of microbes and show the activity against both Gram-positive and Gram-negative bacteria which affect the bacterial cell membrane, increasing its permeability and cause cell lysis, and affect in the death of microbial cells [2,10]

Flavonoids: Flavonoids are important Secondary metabolites of the plants included with quercetin type Compounds and other flavone derivations and these are responsible for Antioxidant activity which were start positively in the ethyl acetate fragment because from its traditional Phytochemical Studies of *Cassia javanica* on flowers, some specific flavonoid glycosides like dihydrorhamnetin glycosides, quercetin trimethyl ether glycosides and Kaempferol glycosides have been insulated and characterized. So, in this Screening of *Cassia Javanica* on extracts, Methanol and Flavonoids disturb the microbial membrane, inhibit the synthesis of nucleic acid, and play a major part in antimicrobial activity [7,11]

Anthraquinones: Anthraquinones composites are characteristic of *Cassia* species which are responsible for

antimicrobial and cathartic properties that stop the synthesis of microorganisms' nucleic acid and disrupt the electron transport system and these compounds are important phytochemicals which gave positive results in crude and ethyl acetate fractions similar as, in phytochemical investigation of *Cassia javanica* seeds, anthraquinones like chrysophanol and physcion along with some unique anthraquinone glycosides were identified [12,13].

Tannins: Tannins are polyphenolic compounds that have been associated in the methanolic extract of *Cassia javanica* as well as in several solvent fragments which inhibit microbial enzymes and precipitate proteins, and makes tannins form an unrecoverable complex with proline-rich proteins present in the microbial cell wall, that destroys cell integrity [14]

Saponins: play an important part in antimicrobial and haemolytic activities which were detected in screening with some solvent excerpt and contains phytochemical glycosidic compounds that also give surfactant properties [15]

Reducing sugars: These substances also play a supportive part in antimicrobial activity by engaging in metabolic interactions and adding the bioactivity of the plant extract [7]. Steroids and cardiac glycosides Steroids and cardiac glycosides have been set up in *Cassia javanica*, and these compounds enhance the plant's antimicrobial properties by increasing membrane permeability and inhibiting microbial enzyme systems. Their collaborative effect alongside other phytochemicals strengthens the overall antimicrobial effectiveness of the plant [7].

Pharmacological activities

The ensuing list describes some important recovery properties of *Cassia javanica*.

Antimicrobial Activity: The Antimicrobial activity is reported with two species that's *Cassia alata* and *Cassia javanica*. The native area of *Cassia alata* is America and *Cassia javanica* is from southern China and Myanmar to western Malaysia. In these studies, used nine microorganism including Gram-positive bacteria and Gram-negative bacteria and result showed death of the microorganism by clear zones of inhibition. While the fruit and leaf extracts of *Cassia alata* showed moderate inhibitory against four bacteria with inhibitory diameter from 10.0-12.5 mm and coming one species flower and leaf extracts of *Cassia javanica* showed moderate inhibition with diameter from 12.5- 13.9 mm [4,11]

Hypoglycaemic And Lipid- Per Oxidative Activity: This activity is performed by using polyherbal formulation including *Cassia auriculata*, *Terminalia arjuna*, *Syzygium jambolanum* and *Cassia javanica* in waterless extract and used rats and rabbits for the testing that result showed as an antilipid- peroxidative activity in diabetic rats that's treated for 28 days. The rats were alarmed on the 29 day and measured colorful natural parameters [9,17]

Antioxidant activity: The methanolic extract of leaves was show antioxidant properties and examine in superoxide anion radical scavenging assay that revealed a strong antioxidant property with 300 microgram per ml concentrations [7]

Antiviral activity: In this activity investigated the Ent- Epiafzelechin-(4a → 8)- Epiafzelechin (EET) extracted from the fresh leaves of *Cassia javanica* L. for the in vitro anti-HSV-2 activity by using XTT and plaque reduction assays. EET inhibited colorful mode of action similar as HSV- 2 and did n't affect HSV- 2 replication in dose dependent manner [7]

Anticancer and Antimycotic activity: In this activity flower of *Cassia javanica* was

performed against different mortal cancer cell lines, similar as colon (HCT- 116), breast (HTB- 26), and liver (HepG2) cancer cells. That show result activity of anticancer as well as antimycotic properties through inhibitory effect on growth and proliferation of tumor cells under in- vitro conditions. In addition, the sample of anticancer properties were also tested against clinical dermatophytes similar as *Trichophyton*, *Microsporum*, and *Epidermophyton* species and result suggesting that the bioactive constituents present in *Cassia javanica* like flavonoids, and phenolic compounds may contribute to both cytotoxic and antifungal effect [7].

Toxicity and Safety Profile of *Cassia javanica*

The toxicity and safety of *Cassia javanica* were estimated grounded on in silico prediction of its major bioactive compounds, including Epiafzelechin derivations and emodin. The prognosticated toxicity values for all compounds were found to be below the threshold limit of 0.5, indicating an overall low toxicity profile. Cardiac toxicity, assessed through hERG channel inhibition, showed low values ranging from 0.039 to 0.067, suggesting minimum risk of cardiotoxic effects. Hepatotoxicity values were also low (0.046 – 0.055), indicating that the compounds are doubtful to produce significant liver toxicity. Similarly, respiratory toxicity was observed to be minimum, with values between 0.025 and 0.076. Mutagenicity (AMES test) predictions revealed low values for Epiafzelechin derivations (0.178 and 0.242), whereas emodin showed an advanced value (0.823), indicating comparatively increased mutagenic potential. However, carcinogenicity values for all compounds ranged from 0.036 to 0.301, remaining below the toxicity threshold and suggesting low carcinogenic risk [18].

Further exploration on *Cassia javanica*

Further exploration on *Cassia javanica* should concentrate on the isolation of pure bioactive compounds and understanding their molecular mechanisms of action. further in vivo studies and clinical trials are demanded to confirm its safety and remedial efficacy. Standardization of extracts and development of effective herbal formulations are also important. also, exploration of lower- studied plant parts and advanced medicine delivery approaches may enhance its pharmaceutical potential.

Conclusion

Cassia javanica is an important medicinal plant with a wide range of traditional uses and scientifically reported pharmacological activities. The plant is rich in bioactive phytochemicals similar as flavonoids, tannins, alkaloids, and phenolic compounds, which contribute to its antimicrobial, antioxidant, and anti-inflammatory properties. colorful studies have supported its implicit remedial applications in the treatment of different diseases. However, utmost of the existing research is limited to primary and in vitro studies. thus, further detailed investigations, including in vivo studies and clinical trials, are necessary to validate its safety and efficacy. Overall, *Cassia javanica* shows significant potential as a natural source of bioactive compounds for the development of effective and safe herbal medicines.

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