IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Cassia tora: A review on its Pharmacognosy, Phytochemistry and Therapeutic uses

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***Abstract*:** Cassia tora linn, a widely distributed medicinal plant, has been traditionally used for its diverse pharmacological properties. This review comprehensively explores its pharmacognosy, phytochemistry and therapeutic potential. The plant itself rich in bioactive constituents, including anthraquinones, flavonoids, glycosides and phenolic compounds, which contribute to its significant pharmacological activities. Traditionally, Cassia tora has been employed in the treatment of various skin diseases, liver disorders and gastrointestinal ailments. Modern research highlights its potential as an antimicrobial, anti-inflammatory, antioxidant, hepatoprotective, antidiabetic and neuroprotective agent. The phytochemical profile of the plant supports its traditional uses and opens opportunities for further pharmacological investigations. This review provides an in-depth analysis of its medicinal significance, the way for future studies to explore its novel therapeutic applications.

***IndexTerms*:** Cassia tora, pharmacognosy, phytochemistry, therapeutic uses, medicinal plant, bioactive compounds

INTRODUCTION:

Cassia tora Linn, a member of the Fabaceae family, is a widely distributed medicinal plant known for its diverse pharmacological applications. Commonly referred to as Chakramarda, Senna tora or Foetid Cassia, it increases in tropical and subtropical regions, particularly in India, China and Southeast Asia. The plant has significant recognition in traditional medicine systems such as Ayurveda, Siddha and Traditional Chinese Medicine (TCM) due to its extensive therapeutic properties. It has been traditionally used for treating ailments like constipation, liver disorders, skin diseases (such as ringworm and psoriasis) and eye infections. The leaves, seeds and roots of *Cassia tora* are highly valued for their medicinal benefits. (1)

Phytochemical studies of cassia tora linn have revealed that *Cassia tora* contains a variety of bioactive compounds, including anthraquinones (chrysophanol, rhein, emodin), flavonoids, glycosides, alkaloids, polysaccharides and saponins, which contribute to its potent pharmacological activities. (2) The seeds are particularly rich in cassiaside, torachrysone and obtusifolin, which exhibit strong antioxidant and anti-inflammatory properties. These bioactive compounds play a vital role in the plant's ability to exert antioxidant, hepatoprotective, antidiabetic, antimicrobial, anticancer anti-obesity, and neuroprotective and cardioprotective effects. Its vast medicinal potential, *Cassia tora* has been the subject of increasing scientific research intended at exploring its applications in modern medicine, particularly in the treatment of metabolic disorders, neurodegenerative diseases and microbial infections. (3)

Fig 1. Cassia tora linn

Fig 2. Flower of Cassia tora linn

Outside its medicinal significance, *Cassia tora* has industrial and economic value. The gum extracted from its seeds is used as a natural thickener and stabilizer in food and pharmaceutical formulations. (4) Additionally, the plant is utilized in cosmetics, animal feed and soil restoration due to its hard nature and high adaptability. Despite its widespread use and increasing scientific interest, there remains a need for a comprehensive review that combines its pharmacognostic, phytochemical and pharmacological properties. This article aims to provide a detailed overview of *Cassia tora*, highlighting its traditional uses, bioactive compounds, pharmacological significance and potential applications in drug development, while also identifying future research. (5)

Vernacular Names of Cassia tora Linn: (6)

- Hindi: Chakramarda, Charota, Panvad
- Sanskrit: Chakramard, Dadmard, Panarika
- Bengali: Chakunda, Panbari
- Gujarati: Kuvadio, Kuvadia
- Marathi: Takala, Tarota
- Tamil: Thagarai, Tagarai
- Telugu: Takarai, Thakara
- Kannada: Tagache, Thagate
- Malayalam: Thakara, Takara
- Punjabi: Panwar
- Urdu: Panwar
- Oriya: Chakunda
- Assamese: Chakunda
- Arabic: Sanai Hindi
- Chinese: Jue Ming Zi

Taxonomical Classification of *Cassia tora Linn:*

- Kingdom: Plantae
- Sub-Kingdom: Tracheobionta (Vascular plants)
- Super Division: Spermatophyta (Seed plants)
- Division: Magnoliophyta (Flowering plants)
- Class: Magnoliopsida (Dicotyledons)
- Sub-Class: Rosidae
- Order: Fabales
- Family: Fabaceae (Leguminosae)
- Sub-Family: Caesalpinioideae
- Genus: *Cassia*
- Species: *Cassia tora* Linn.

Botanical Distribution of *Cassia tora* Linn*: (7)*

Cassia tora is widely distributed across tropical and subtropical regions and grows in warm, humid climates. It is commonly found in India, China, Southeast Asia, Africa and South America. The plant grows plentifully in wastelands, roadsides, agricultural fields, riverbanks and forest edges often thriving in disturbed or fallow lands.

Ethnopharmacology of *Cassia tora* Linn.

Cassia tora has been widely used in traditional medicine systems such as Ayurveda, Siddha, Traditional Chinese Medicine (TCM) and folk medicine for treating a variety of diseases. In Ayurveda and Siddha, it is regarded as a "Rasayana" (rejuvenating herb) with potent purgative, anthelmintic, antifungal and hepatoprotective properties. It is commonly used for constipation, liver disorders, skin diseases (such as eczema, psoriasis, and ringworm) and eye infections. The seeds are used to improve digestion and respiratory health, while the leaves are applied externally to heal wounds, relieve inflammation and treat skin infections. In Traditional Chinese Medicine (TCM), *Cassia tora* is called Jue Ming Zi (决明子) and is widely used for eye health, liver detoxification and cardiovascular support. The seeds are believed to improve vision, lower blood pressure and reduce inflammation, making them an essential component in herbal formulations for treating headaches and dizziness caused by liver dysfunction.

In African and Southeast Asian folk medicine, *Cassia tora* is usually used to treat malaria, bacterial infections and stomach disorders. The leaves and seeds are effective in expelling intestinal worms, alleviating dysentery and combating fungal infections. Various tribal communities in India, such as the Gond, Bhil and Santhal tribes, uses the plant as a blood purifier and digestive aid. The seeds, when baked and consumed as a coffee substitute, are believed to reduce fatigue and improve digestion. Additionally, the leaves, when crushed and applied as a paste, are used to relieve joint pain and arthritis. Medicinal preparations from *Cassia tora* include decoctions and infusions for digestive and liver ailments, paste applications for skin diseases and wounds, seed powder for eye care and diabetes management and oil extracts for fungal and inflammatory conditions.

The traditional uses of *Cassia tora* have attracted scientific interest, leading to pharmacological investigations confirming its antimicrobial, hepatoprotective, antidiabetic and anti-inflammatory properties. However, while traditional knowledge provides valuable insight into its medicinal potential, further clinical studies and pharmacological validations are necessary to fully integrate *Cassia tora* into a modern therapeutic applications.

Phytochemistry of *Cassia tora* Linn*: (8) (9)*

The seeds of *Cassia tora* Linn., known as Juemingzi in Chinese and are a well-known traditional Chinese medicine and are officially listed in the Chinese Pharmacopoeia. They have been historically used to enhance visual acuity and possess a wide range of medicinal properties, including antimicrobial, antidiuretic, antidiarrheal, antioxidant, hepatoprotective and antimutagenic effects. The bioactive constituents responsible for these pharmacological activities primarily belong to the anthraquinone class, which includes compounds such as 1-desmethylaurantio-obtusin, 1-desmethylchryso-obtusin, aurantio-obtusin, chryso-obtusin and obtusin.

Five key anthraquinones—aurantio-obtusin, 1-desmethylaurantio-obtusin, chrysoobtusin, obtusin and 1-desmethylchryso-obtusin—have been successfully isolated and purified using high-speed counter-current chromatography and semipreparative high-performance liquid chromatography (HPLC). Additionally, an anthraquinone glucoside, identified as alaternin 2-O-β-D-glucopyranoside, has also extracted from *Cassia tora* seeds. Apart from these, the seeds contain several other bioactive anthraquinones such as chrysophanol, emodin and rhein, which are considered to be the primary contributors to the plant's medicinal properties.

Research suggests that anthraquinone aglycones from *Cassia tora* exhibit substantial inhibitory effects against aflatoxin B1, as demonstrated in the Ames test. Several studies have also shown that anthraquinones can act as antimutagens, helping to counteract the mutagenic effects of mycotoxins, polycyclic aromatic hydrocarbons and heterocyclic amines (HCAs). Furthermore, *Cassia tora* seed extracts have been found to enhance the activity of hepatic enzymes such as catalase, superoxide dismutase and glutathione peroxidase in rats with ethanol-induced hepatotoxicity. More recent studies have reported that ethanolic extracts of *Cassia tora* show hypolipidemic activity in Wistar rats. Additionally, the plant extract has been shown to modulate oxidative DNA damage in human lymphocytes showing to hydrogen peroxide, as assessed by the Comet assay. The major antioxidant compound identified in *Cassia tora* responsible for this activity is emodin.

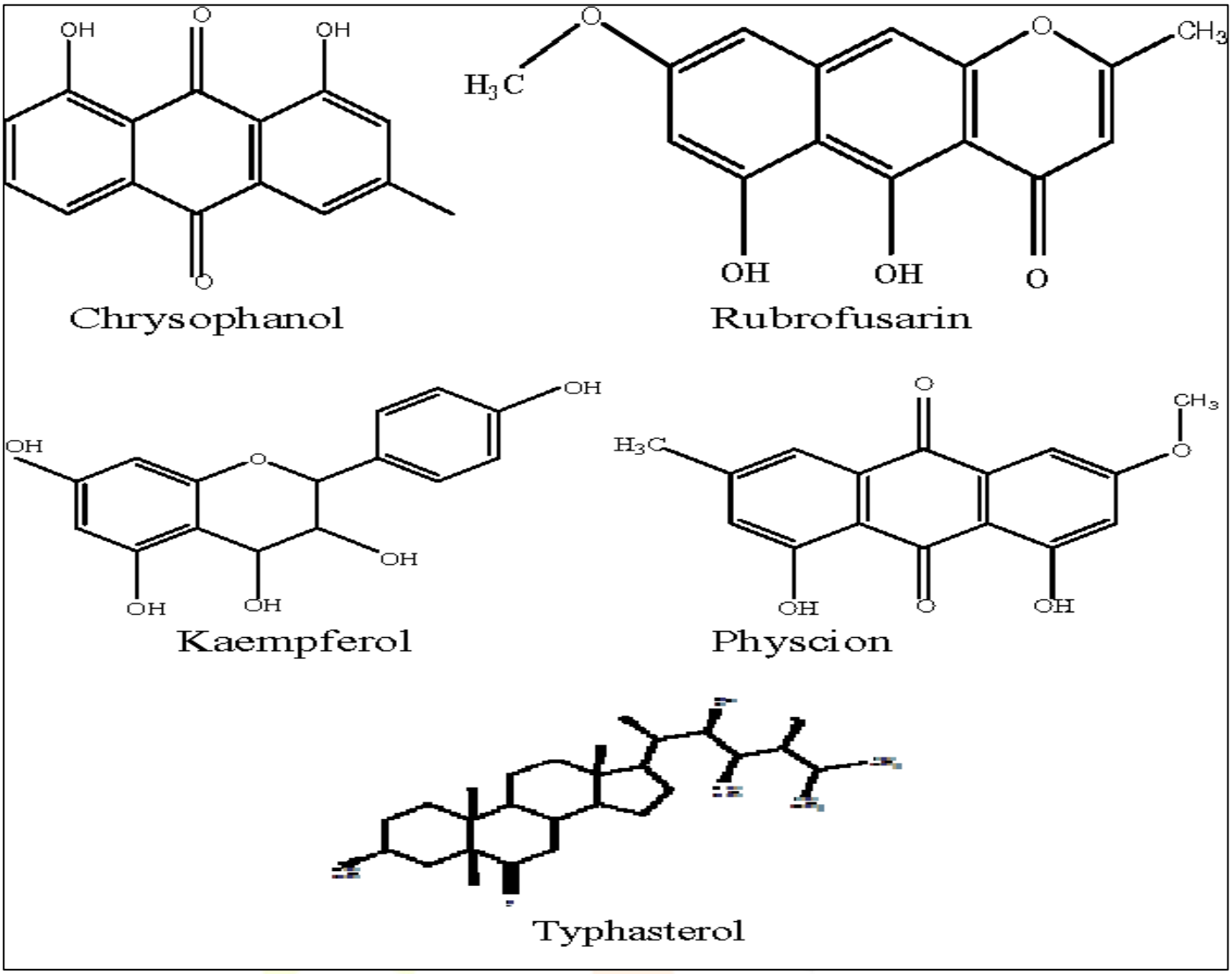

Fig 3. Chemical structures of cassia tora linn

Pharmacological Activities of *Cassia tora* Linn:

Antimicrobial Activity: (10) (11)

The methanolic and aqueous extracts of *Cassia tora* leaves have demonstrated significant antibacterial activity against Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli when tested using the disc diffusion method. Additionally, ethanolic and aqueous extracts were evaluated for their antibacterial effects, with both showing considerable efficacy, particularly the aqueous extract, which exhibited a stronger antibacterial effect against Pseudomonas aeruginosa, Staphylococcus aureus, and Lactobacillus.

Anthelmintic Activity: (12) (13)

The methanolic extract and ethyl acetate fraction of *Cassia tora* leaves, tested at 10, 25 and 50 mg/ml concentrations, exhibited dose-dependent anthelmintic activity against Indian earthworms (*Pheretima posthuma*), foremost to their paralysis and death. Furthermore, both alcoholic and aqueous extracts of *Cassia tora* seeds were evaluated for their anthelmintic properties, with a concentration of 100 mg/ml showing significant paralytic and lethal effects on adult Indian earthworms.

Hepatoprotective Activity: (14) (15) (16)

The ethanol extract of *Cassia tora* leaves, when administered for 21 days, showed significant hepatoprotective effects in rats with carbon tetrachloride-induced hepatic damage. It led to a notable reduction in SGOT, SGPT and lactate dehydrogenase levels, while significantly enhancing antioxidant enzymes such as superoxide dismutase, glutathione

peroxidase, glutathione S-transferase and catalase. Another study on D-galactosamine-induced liver injury in male Sprague-Dawley rats found that dietary supplementation of ethanol extracts (0.25% and 0.5%) effectively reduced elevated aspartate aminotransferase, alanine aminotransferase, and glutathione peroxidase enzyme levels. Moreover, the methanolic extract of *Cassia tora* leaves confirmed significant hepatoprotective potential in rats with carbon tetrachloride-induced liver injury at a dose of 400 mg/kg body weight.

Hypolipidemic Activity: (17) (18)

The ethanol extract of *Cassia tora* seeds, when administered at a dose of 100 mg/kg body weight for five days, effectively regulated lipid levels and reduced triglyceride concentrations in rats with triton-induced experimental hyperlipidemia. Additionally, in a high-fat diet-induced hyperlipidemia rat model, oral administration of 500 mg/kg body weight for 15 days led to a substantial reduction in total cholesterol, phospholipids and triglycerides, restoring lipid balance.

Antidiabetic Activity: (19) (20) (21)

The methanol extract of *Cassia tora* leaves at a dose of 1000 mg/kg body weight was found to reduce elevated blood glucose levels in rats with alloxan-induced diabetes. Furthermore, the butanol fraction of the leaves, when tested for its postprandial glucose-lowering effect in both normal and streptozotocin-induced diabetic rats, significantly reduced glucose levels at 30–80 minutes post-administration in normal rats and at 30 minutes in diabetic rats during a maltose loading test. Additionally, the ethyl acetate, methanol, and aqueous extracts of *Cassia tora* leaves demonstrated noteworthy antidiabetic activity in Wistar rats with experimentally induced diabetes at doses of 200 and 400 mg/kg body weight.

Antiulcer Activity: (22) (23) (24)

The methanol extract of *Cassia tora* seeds at doses of 150 and 200 mg/kg body weight significantly reduced ulcer index in Wistar rats subjected to the pyloric ligation method and NSAID-induced ulcer model. Moreover, the hydroalcoholic extract of *Cassia tora* leaves, when administered at 500 mg/kg body weight, exhibited antiulcer effects in ethanol-induced gastric ulcer models, leading to significant reductions in ulcer score, gastric juice volume, and acidity. Additionally, the methanol extract of *Cassia tora* leaves was tested for antiulcer activity in BALB/c mice with ulcerative colitis induced by dextran sulfate sodium, where 400 mg/kg body weight for 14 days effectively alleviated symptoms such as diarrhea, bleeding, weight loss, and colon tissue damage restoration.

Skin Disorders / Antifungal Activity: (25) (26) (27)

The ethanolic extract of *Cassia tora* leaves at a dose of 400 mg/kg body weight displayed significant antipsoriatic activity in male Wistar rats subjected to ultraviolet B-ray-induced photodermatitis. The treatment led to reduced epidermal thickness, and histological examination revealed the absence of Munro's microabscesses, elongation of rete ridges, and capillary loop dilation. Additionally, the dealcoholized methanol extract of *Cassia tora* leaves, tested at 100, 200, and 300 µg/ml, exhibited strong antifungal activity against Candida albicans, Aspergillus niger, and Saccharomyces cerevisiae when evaluated using turbidity and spore germination methods in vitro. The methanolic extract of *Cassia tora* leaves also showed significant antifungal activity against *Candida albicans* in vitro using the cup plate method, with a minimum inhibitory concentration (MIC) of 2 mg/ml as determined by broth dilution technique. Additionally, the alcoholic extract of *Cassia tora* seeds, evaluated using the culture and sensitivity test, exhibited a dose-dependent inhibition of dermatophytes isolated from skin samples of infected patients, at concentrations of 1.25, 2.5, 5, 10, and 20 µl.

This broad spectrum of pharmacological properties exhibited by *Cassia tora* highlights its therapeutic potential and underscores the need for further studies to validate its efficacy and clinical applications.

CONCLUSION:

Cassia tora is a valuable medicinal plant with a rich pharmacognostic profile and diverse therapeutic applications. Its bioactive constituents, including anthraquinones, flavonoids and glycosides, contribute to its significant pharmacological activities such as antimicrobial, antioxidant, hepatoprotective, antidiabetic and anti-inflammatory effects. Traditional and modern research supports its medicinal potential, yet further in-depth studies, including clinical trials and mechanistic evaluations, are required to validate its efficacy and safety. The examination of novel formulations

and drug delivery systems incorporating Cassia tora could enhance its therapeutic benefits and expand its applications in modern medicine.

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