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Phytochemical analysis and antifungal activity of medicinal plant *Cassia tora*

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Abstract
The goal of the current study was to examine the *in vitro* anti-fungal activity of the *Cassia tora*, an Indian traditional medicine plant. Separated plant material was extracted in stages using organic solvent. The solubility, moisture content, melting point, FTIR, and other qualitative analysis for photo components were assessed for extracts. By using the agar well diffusion method, *in vitro* antifungal experiments were conducted. Four test samples with a 5%, 10%, 15% and 20% concentration were created. Extract was discovered to be effective against numerous fungi species. A test sample at 20% demonstrates improved fungal strain zone of inhibitions. It was found to be in the range of 11mm to 20 mm.

Keywords: *Cassia-tora*, anti-fungal and phytochemical

1. Introduction
In practically every Asian nation, a little shrub known as *Cassia tora* spreads like a weed [1-5]. Theleguminosae [6, 7], sometimes referred to as the legume, pea, or bean family, is a sizable and significant plant family from the standpoint of the economy. Legumes are a sort of species in which the seeds sprout to develop in to pods [8, 9]. Legumes are an important component of a balanced diet because they are an excellent source of protein, dietary fibre, carbohydrate, and minerals [10-14]. The nutritional makeup of legumes as a whole makes them perfect Animal meals [15] to satisfy dietary recommendations. Legumes have been acknowledged as a food with medicinal and health-promoting characteristics [16, 17]. Lentil Cassia tora belongs to the Casual pinioideae subfamily [18]. Its name is derived from the Sinhalese language, where it is known as Tora and is a 30-90 cm tall annual herb that grows wild in India's wasteland during the rainy season. Much of India is home to the weed-like wild crop known as Cassia tora [19]. The primary functional elements of Cassia tora are leaves, roots and seeds. Many active compounds, such as anthraquinone, quacetin, chrysophenol, emodin, and rhein, have been shown to be present in cassia tora. Significant antimutagenic action for Cassia tora has been found [1, 2, 20]. Because anthraquinone functions as a fluorescence sensor or fluorophores [21-24], this plant also exhibits sensing abilities. It contains "Dadhughnavati," an Ayurveda preparation that is one of the most effective antifungal compositions [25].

2. Methods
2.1 Plant sample collection
The leaves of Casia tora, was collected in good condition and shipped to the laboratory from Rajasthan, India. Following a thorough rinsing under running water, the leaves were left to air dry at room temperature. The dried plant samples were powdered and stored in sealed plastic bags in advance of further investigation. Each plant underwent botanical authentication in accordance with APG IV classification.

2.2 Preparation of plant extract
The dried powder was sequentially extracted in ethanol. Using a Soxhlet apparatus and 160 ml of each ethanol, 10 g of the dried and powdered plant material was extracted for 6 to 8 hours at a temperature below the boiling point of the solvents. The obtained crude extracts were then purified using Whatman No. 1 filter paper and stored at 4 °C for later use. Concentration was accomplished using a rotary evaporator at 40 °C while under vacuum.

2.3 Phytochemical analysis
The extract of *Casia tora,* was tested for the presence of bioactive compounds by using following standard methods [26-28].

2.3.1 Test for Alkaloids
a. Mayer's test
To a 1 mL of plant sample extract, 2 mL of Mayer's reagent was added along the sides of the test tube. Appearance of white creamy precipitate indicates the presence of alkaloids.

b. Wagner's test
To a 1 mL of plant sample extract, 2 mL of Wagner's reagent was added along the sides of the test tube. A reddish-brown precipitate confirms the test as positive.

c. Hager's test
To a 1 mL of extract, 3 mL of Hager's reagent was added and appearance of yellow precipitate gives positive result.

2.3.2 Test for Steroids
a. Libermann-Burchard's test
The extract was dissolved in of 2 mL acetic anhydride. To this, 1 or 2 drops of concentrated sulphuric acid was added slowly along the sides of the test tube. An array of colour change shows the presence of steroids.

b. Salkowaski test
1 mL of extract, chloroform and concentrated sulphuric acid was mixed and two layers were formed. Colour change from bluish red to cherry red in chloroform layer and green fluorescence in acid layer gives positive result.

2.3.3 Test for Flavonoids
a. Lead acetate test
1 mL of plant extract was taken and slowly few drops of 10% Lead acetate solution was added. Formation of yellow precipitate gives a positive result.

2.3.4 Test for Glycosides
a. Keller kilani test
1 mL of extract was mixed with acetic acid containing traces of ferric chloride, mixture was then transferred to a test tube containing concentrated sulphuric acid. Colour change from reddish brown to blue at function of two phase gives positive result.

2.4 Antifungal activity
Agar well diffusion assay technique is frequently employed to assess the efficacy of antifungal medications. Potato dextrose agar was placed in the petri plate. After 20 minutes, the agar plates had solidified. Use a spreader to apply fungus liquid culture (1 ml) on the agar plate that has hardened. Four wells with a diameter of 5 mm each were drilled onto each plate using a sterile corn borer. Please provide the welled 5%, 10%, 15%, and 20% plates. Plant extract was combined with ethanol, at concentrations of 5%, 10%, 15%, and 20%. 80-100 ul of solution in various dilutions from extract was injected into the well, which was kept at 4 °C for 10 minutes, using a decontaminated syringe. On each plate, fungal pathogen culture was then carried out for 46-48 hours at 28 °C. The diameter of the inhibitory zone was measured for each and every well to record the outcomes (mm). The components of all plants were tested against each fungal strain taken into account for the tests for each extract in a replication of three.

3. Results and Discussion
The pharmacological effects of the plant is due to the presence of bioactive chemical constituents. *Cassia-tora* contained all tested constituents as shown in Table.1

Table 1: Preliminary phytochemical analysis

(A) Alkaloids	
Wagner's test	+ve
Mayer's test	+ve
Hager's test	+ve
(B) Steroids	
Salkowaski test	+ve
(C) Flavonoids	
Lead acetate test	+ve
(D) Glycosides	
Keller kilani test	-ve

Table 2: Percentage Inhibition at Different Conc

Pathogen	Percentage inhibition at different conc.			
	5%	10%	15%	20%
R.bataticola	18	17	16	15
A.alternata	20	18	17	17
S.sclerotioum	16	15	14	11

According to the aforementioned data, it can be concluded that the extract of *Cassia tora* significantly inhibited the growth of a number fungi like *R.bataticola*, *A.alternata* and *S.sclerotioum* have been inhibited by it. The fluoroquinolone derivative ofloxacin is typically used to treat upper respiratory infections, enteric fever, and urinary tract infections. As it functions as a broad -spectrum antibiotic, it is a common medication. Test samples of *Cassia tora* extract was taken at concentrations of 5%, 10%, 15%, and 20%.
The phenolic compounds are one of the most major and widespread classes of plant metabolites [29]. They possess biological traits such as anti-cancer, anti-aging, and anti-apoptosis. Anti-inflammatory, anti-atherosclerotic, cardiovascular protection, enhanced endothelial function, and reduction of angiogenesis and cell proliferation activities [30]. Many studies [31-32] have examined the antioxidant benefits of medicinal plants rich in phenolic components. Flavonoids, phenolic acids, tocopherols, and other plant phenolic compounds are the main source of natural antioxidants. [33]. Proline-rich proteins become bonded to tannins, which stop the synthesis of new proteins. In response to microbial infection, plants have been observed to create flavonoids, which are hydroxylated phenolic molecules. It has been demonstrated that flavonoids have antibacterial effects *in vitro* against a range of diseases.

4. Conclusion
It is firmly considered that the aforementioned comprehensive information from a thorough literature review on the many activities of *Cassia tora* may offer comprehensive proof for the wide range of pharmacological and therapeutic possibilities. More research is required to determine ways to eliminate the toxicity of plant leaves after the toxicity of plant leaves was also researched. Consequently, it was established that *Cassia tora* extract was effective against several fungal species. It can also be made into a topical formulation to treat common skin conditions such eczema, dermatitis, itching, and rashes. Further *in vivo* research is required to confirm the results.

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