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Phytochemical evaluation and antimicrobial screening of Cassia fistula leaf

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ABSTRACT:
Cassia fistula is also known as the golden shower, Indian laburnum, member of Fabaceae family. This study was carried out with an objective to investigate the antibacterial and antifungal potentials of leaves of **Cassia fistula** Linn. A preliminary phytochemical analysis was carried out, which showed the presence of many active constituents like Alkaloids, Carbohydrates, Flavonoids, Proteins, Saponins and Tannins. The aim of the study is to assess the antimicrobial activity and to determine the zone of inhibition of extracts on some bacterial and fungal strains. The antimicrobial activity was determined in the extracts using agar well diffusion method. The results showed that the remarkable inhibition of the bacterial growth was shown against the tested organisms.

Keywords: Antibacterial, Antifungal, Cassia fistula**,** Chlorophyll

I. INTRODUCTION

Cassia fistula Linn. Is a wild tree and mainly grows on roadside throughout India. Cassia Fistula is moderate sized deciduous tree 10m tall,yellow flowers, leaves alternate pinnate, 30-40 cm long, with 4-8 pairs of ovate leaflets, 7.5-15cm long, 2-5cm broad fruits pendulous, cylindrical, brown, separate, 25-50cm long, 1.5-3cm in diameter, with 25-100 seeds. Seeds lenticular, light brown, lustrous, Cassia fistula grows throughout in Bangladesh and in many other Asian countries and is used as a traditional herbal medicine in India, China, Hong kong, Philippines, Malasia, Indonesia and Thailand.[1]

Antimicrobial activity refers to the process of killing or inhibiting the disease causing microbes. Various antimicrobial agents are used for this purpose, such as antibiotics, antiseptics, disinfectants, and biocides[2]. Antimicrobial agents may be classified based on their target microorganisms, such as antibacterial, antifungal, antiviral, or antiparasitic.[3]

Antimicrobial activity is important for various applications, such as food preservation, infection control, wound healing, and drug delivery. However, the widespread use of antimicrobial agents has also led to the emergence of antimicrobial resistance, which poses a serious threat to human health and requires the development of new and effective antimicrobial strategies.

II. MATERIALS AND METHODS

COLLECTION OF PLANT MATERIALS

The plant Cassia fistula was collected from Palakkad, Kerala. The plant material was identified and authentication was carried out by Dr.Suresh V, Assistant Professor of Government Victoria College, Palakkad

Isolation of Leaf pigments from Cassia fistula

Fresh leaves were collected and cut into small pieces.Isolation of the leaf pigment were carried out by taking two gram of finely cut fresh leaves were taken and ground with 20–40ml of 80% acetone grinding the small pieces of leaf with acetone in mortar. It was then centrifuged at 1000-1500rpm for 10mins. The supernatant was transferred and the procedure was repeated till the residue becomes colorless. The absorbance of the solution was red at 645nm and 663nm against the solvent (acetone) blank.The supernatant liquid is then evaporated in a water bath to get the concentrate.Concentrate then weighed and stored in desiccator and used for phytochemical profile and anti-microbial study[4,5].

Estimation of Chlorophyll content from Cassia fistula[6,7]

The concentrations of chlorophyll a, chlorophyll b and total chlorophyll were calculated using the following equation:
Total Chlorophyll: 20.2(A645)+8.02(A663)
Chlorophyll a: 12.7(A663) – 2.69(A645)
Chlorophyll b: 22.9(A645) – 4.68(A663)

Preliminary Phytochemical Screening

The dried powder of Cassiafistula leaf was subjected to preliminary screening of

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phytochemical constituents[8, 9, 10]

Antimicrobial study of Cassia fistula leaf
Agar well diffusion method[11]

Bacteria used: E.coli(Gram negative), Bacillussubstalis (Gram positive)
Fungi used : Saccharomyces cerevisiae
Preparation of nutrient medium

- Add 1.3g of nutrient broth powder and agar-agar 2g in 100ml distilled water.
- Mix and dissolve them completely.
- Sterilize the medium.

Anti-bacterial and Anti-fungal activity

Nutrient agar plate was prepared by pouring mixture of medium and subculture into each sterile petri plate and allowed to set at room temperature.Wells were prepared by sterile cork boarer. Then sample is placed in wells and incubated at 37 C for 24hrs.The zone of inhibition is measured.

III. RESULTS

Estimation of Chlorophyll

Chlorophyll	Result
Total Chlorophyll	8.348 µg/ml
Chlorophyll a	3.996 µg/ml
Chlorophyll b	4.355 µg/ml

Preliminary Phytochemical Screening

Phytoconstituents	Results
Alkaloids	+
Carbohydrates	+
Flavonoids	+
Proteins	+
Saponin	+
Tannins	+

Antimicrobial study of Cassia fistula leaf
Antibacterial activity:

Test solution	Concentration (mg/ml)	Zone of inhibition(mm)	
		Bacillus substalis (gram positive)	E.coli (gram negative)
Isolated leaf pigment	100	20.3	11.6
	200	24	22.6
	300	22.6	19.6
STD(Gentamicin)	0.1	43.6	32.2
DMSO	0	0	0

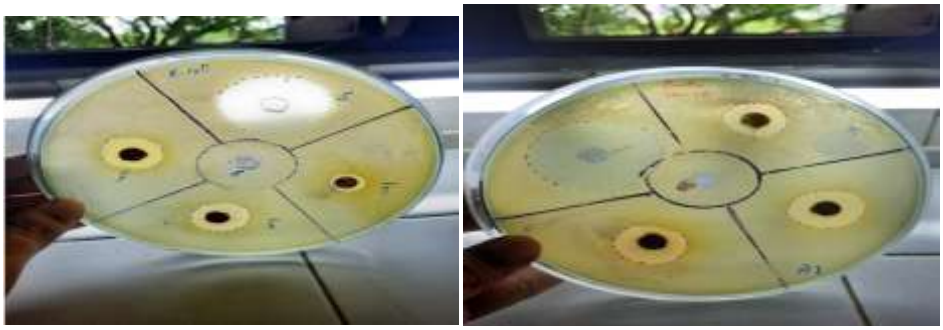

Fig 1 Antibacterial activity of Ecoli and Bacillus substilis

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Antifungal activity

Test solution	Concentration (mg/ml)	Zone of inhibition(mm)
		Saccharomyces cerevisiae
Isolated leaf pigment	100	18
	200	19.6
	300	20
STD(clotrimazole)	0.1	28
DMSO	0	0

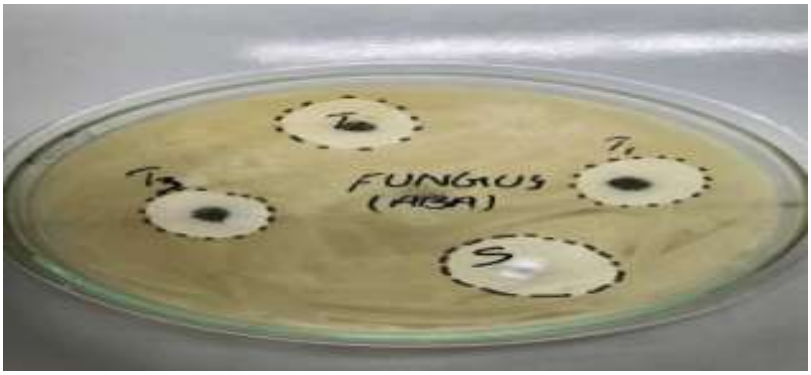

Fig 2 Antifungal activity of Saccharomyces cerevisiae

IV. CONCLUSION:

Cassia fistula was subjected to preliminary phytochemical screening for the current investigation.This journal aimed to evaluate the antimicrobial activity of Cassia fistula leaf extract against E. coli, Bacillus substilis, and Saccharomyces cerevisiae. Through a series of experiments and analyses, the findings provide valuable insights into the potential antimicrobial properties of Cassia fistula as a natural alternative to combat microbial infections.

The results of the study indicate that the leaf extract of Cassia fistula possesses significant antimicrobial activity against the tested microorganisms. It exhibited inhibitory effects on the growth of E. coli, Bacillus substilis, and Saccharomyces cerevisiae, suggesting its potential as a broad-spectrum antimicrobial agent.The maximum zone of inhibition was found on the concentration of 200mg/ml of the isolated leaf pigment in case of bacteria and 300mg/ml incase of fungus.

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