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Phytochemical Screening and Antimicrobial activity of ethanolic extract of *Cassia tora* L. and *Cassia alata* L. leaves

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Research Article

Phytochemical Screening and Antimicrobial activity of ethanolic extract of *Cassia tora* L. and *Cassia alata* L. leaves

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ABSTRACT

Aim: The aim of the present study was to preliminary phytochemical investigation and antimicrobial activity of ethanolic leaf extract of *Cassia alata* L. and *C.tora* L. **Methods:** The air- dried plant materials of *Cassia alata* and *Cassia tora* leaves were extracted in the Soxhlet apparatus for 2h. The collected extracts were studied on the preliminary phytochemical screening and antimicrobial activity of the disc- diffusion method. **Results:** The results of the present study, preliminary phytochemical studies on both *Cassia* species revealed that identification of active compounds such as alkaloids, terpenoids, flavonoids, tannins, saponins, and glycosides and no terpenoids present in the *Cassia alata* leaves. Both leaf extracts were observed that maximum antimicrobial activity active against *E. coli* and *Candida albicans*.

Keywords: *Cassia tora*, *Cassia alata*, Fabaceae, antimicrobial activity, leaves, Ethanolic extracts

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1. INTRODUCTION

Phyto-chemical studies of raw plant extracts reveal the existence of active compounds in various plant parts, including bark, leaves, flowers, roots, fruits, and seeds. To date, it is estimated that only 20 to 30% of the 350,000 recognized plant species have been thoroughly examined for their phytochemical properties; consequently, the true number of secondary metabolites within the plant kingdom is likely to surpass 200,000 compounds (Seigler, 1998). Phyto-chemicals are nonnutritive plant chemicals that have protective or disease preventive properties. Plant produces these chemicals to protect itself but research works demonstrates that many phytochemicals can protect humans against diseases. Knowledge of the chemical constituents of plants is desirable because such information will be of value for the synthesis of complex chemical substances (Usha Veerachari *et al* ., 2011).

The genus Cassia L., is one of the largest genera, which is flowering plant family Fabaceae, including three subgenera are *Cassia* L., Senna Mill., and Chamaecrista Moench (Plants of the World Online,2023). It is widely distributed in tropical and subtropical regions. These species were great diversity depending on their habitat, ranging from annual herbs and shrubs to tall trees (Elaheh Zibaee *et al*.,2023). Medicinal applications of Cassia, Senna, and Chamaecrista date to over 2000 years ago. Literature review of this genus is pulps of *C. fistula*, commonly known as "Folus". it is widely used as a purgative febrifuge and a remedy for jaundice, leishmaniasis, and infantile colic (Amiri *et al*.,2014). In Indian folk medicine, *C. fistula* is believed to be beneficial for the treatment of inflammatory diseases, skin problems, rheumatism, ulcers, anorexia, jaundice, and as a laxative (Dave and Ledwani,2012). In Brazil, the bark, leaves, and seeds of C. fistula have been used as a remedy against malaria parasites (Grace *et al*.,2012). In China, *C. fistula* has been extensively used as an anti-inflammatory, antioxidant, chemopreventive and chemotherapeutic activity (Rahmani,2015). *Cassia tora* (Common name: Charota/Chakunda) has been a subject of considerable interest as herbal medicine worldwide. *C. tora*. The leaves and seeds of *C. tora* are reported to have curative effect in leprosy, flatulence, colic, dyspepsia, constipation, cough, bronchitis, cardiac disorders, skin diseases, and liver disorders (Shakywar *et al*.,2011). *C. tora* leaves were found positive for phenols, tannins, saponins, glycosides, flavonoids, steroids, and alkaloids (Shaikh and Syed,2015). The genus of Cassia species of *C.alata, C.fistula*, and *C.tora* were medicinally used for treat ringworm and skin diseases (Farnsworth and Bunyaprapatsara, 1992). The aim of the present study was to preliminary phytochemical investigation and antimicrobial activity of ethanolic leaf extract of *Cassia tora* L. and *C.alata* L.

MATERIALS AND METHODS

2.1 Collection of Plant Materials

The plant materials of *Cassia tora* L. and *Cassia alata* L. were collected from Reetiyarpatti Scrub forest, Tirunelveli,Tamilnadu.

2.2 Plant extract

100gms both leaves of *Cassia tora* L. and *Cassia alata* L. were collected, identified, shed dried, and powdered using an electric grinder. The ethanolic extract from the powder was prepared by using Soxhlet's apparatus in 2h. The obtained extracts were evaporated on water bath to give dried residues. The dried extracts were labelled and stored in airtight screw cap box in refrigerator at 4°C until use.

2.3 Phytochemical screening

The freshly prepared ethanolic extracts of *Cassia tora* L. and *Cassia alata* L. were subjected to preliminary phytochemical screening for the presence or absence of various active metabolites using standard chemical tests previously described by according to Harbone,(1973); Raaman, (2006) methods.

2.4 Antimicrobial activity

The *in -vitro* antimicrobial activity was carried out by disc- diffusion method previously described (Seely and Vandemark,1981). Both leaf extract of *C. alata* and *C. tora* were screened for antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Streptococcus pyogenes* (Gram positive) and *Salmonella typhimurium, Escherichia coli, Klebsiella pneumonia* (Gram negative) bacterial strains using ampicillin as standard. The antifungal activity was investigated against *Aspergillus niger, Candida albicans, Trichoderma viridae* fungal strains using ketoconazole as standard. Preliminary screening of both extracts and standard drugs was performed at fixed concentrations of 1000µg/ mL^{-1}. Inhibition was recorded by measuring the diameter of the inhibition zone (mm) at the end of 48 h for bacteria and 72h for fungi. Each experiment was repeated thrice and the average of the three independent determinations was recorded.

3. RESULTS AND DISCUSSION

3.1 Phytochemical screening

The different qualitative chemical tests were carried out on the aqueous extract using standard procedures to identify the constituents as described (Harbone,1973). The result of the present study, observed that both species of *Cassia alata* and *Cassia tora* revealed that active constituents present is alkaloids, flavonoids, terpenoids, glycosides, tannins and saponins while, terpenoids is absent in the *Cassia alata* (Table-1). Previous studies, preliminary phytochemical screening of both species of *C. occidentalis* and *C. uniflora* were revealed that present is alkaloids, flavonoids, glycosides, tannins and saponins and absence of terpenoids in both species (Khyade *et al*.,2015). Earlier studies, alkaloids are found in the ethanol, methanol and ethyl-acetate extracts of *Cassia spectabilis*, *Cassia siamea* and *Cassia hirsuta* (Usha Veerachari and Bopaiah, 2011).

3.2 Antibacterial activity

Antimicrobial properties of medicinal plants are being increasingly reported from the different parts of the world. The World Health Organization estimates that plant extract or their active constituents are used as folk medicine in traditional therapies of 80% of the world's population. In the present work, the extracts obtained from both species of *Cassia alata* L. and *C. tora* L. show strong antimicrobial activity against the tested bacterial and fungal strains represented in the table-2.

The results were compared with standard antibiotic drugs. Previous studies, according to Bhalodia and Shukla,(2011) reported that extract of *Cassia fistula* were active against good antimicrobial activity. The present study was observed that ethanolic extract of both species of *C. tora* and *C. alata* showed antibacterial activity against all tested bacteria seen in table- 2, but maximum activity was recorded against *E.coli* (17mm) and 21(mm). Same results observed by previous studies reported that *C. tora* was antibacterial activity against *Escherichia coli* and resistant to *Staphylococcus aureus* and *Pseudomonas aeruginosa* (Sahu et al.,2017). The methanolic extracts of *C.fistula* exhibited antibacterial activity against *Staphylococcus aureus* (Kamath, and Kizhedath, 2019).

3.3 Antifungal Activity

The present study was observed that ethanolic leaf extract of *Cassia alata and Cassia tora* showed highly inhibitory activity against *A. niger, C. albicans* and *T. viridae* (Table-2). Several studies reported on the antifungal activities of leaf extracts of several plant species (Fuzellier *et al*.,1982; Ibrahim and Osman,1995; Timothy *et al*.,2012). Some studies have shown limited or no antifungal activity for methanolic leaf of *Cassia fistula* extract active against *Candida albicans* and *Aspergillus niger* (Kamath and Kizhedath, 2019) but *C. surattensis* flower extract potently inhibited the growth of *A. niger* (Sumathy et al.,2013). Studies have investigated the antifungal activity of compounds like anthraquinones and flavonoids isolated from this species. Antifungal activity is often attributed to the presence of compounds like saponins, flavonoids, and alkaloids.

Table-1: Phytochemical analysis of ethanolic extract of *Cassia alata* and *Cassia tora* leaves

Sl.No.	**Bioactive Constituents**	**Presence/ Absence**	
		Cassia alata	Cassia tora
1	Alkaloids	++	++
2	Flavanoids	+++	+++
3	Terpenoids	-	+++
4	Glycosides	+++	+++
5	Tannins	++	++
6	Saponins	+	+

"+" indicates presence; "p-" indicate absence

Table 2: Zone of inhibition of extract of *Cassia tora* L. and *Cassia alata* L. against different bacteria and fungi

Tested micro-organisms		**Zone of Inhibition (mm)**		
		C. tora	*C. alatta*	Antibiotics
Gram-positive bacteria	*S. aureus*	12	14	41[a]
	B. subtilis	15	**18**	37[a]
	S. pyogenes	17	15	39[a]
Gram-negative bacteria	*S. typhimurium*	14	17	42[a]
	E. coli	**21**	17	39[a]
	K. pneumonia	13	16	11[a]
Fungi	*A. niger*	19	**21**	43[b]
	C. albicans	17	20	38[b]
	T. viridae	17	20	40[b]

[a] Ampicillin; [b] Ketoconazole

3.4 CONCLUSION

The conclusion of the present study observed that both species of *Cassia alata* L. and *C. tora* L. were found to be exhibit a greater antibacterial and antifungal activity against *E.* coli and *A. niger*. Consequently, additional studies focusing on the efficacy and safety of this promising herb are recommended, with the aim of substituting some of the less effective options currently used in clinical practice. Moreover, research efforts directed towards the isolation and structural elucidation of the antibacterial active compounds derived from the plant have commenced.

4. ACKNOWLEDGEMENT

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5. CONFLICT OF INTEREST

None.

6. REFERENCES

Seigler, D.S. (1998). Plant Secondary Metabolism. Springer Science; New York, NY, USA:pp. 1-759.

Usha Veerachari and Bopaiah, A. K. (2011). Preliminary phyto-chemical evaluation of the leaf extract of five *Cassia* Species. J. Chem. Pharm. Res., 3(5):574-583.

Plants of the World Online(2003). Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; http:// www.plantsoftheworldonline.org/Retrieved 23 September 2023.

Elaheh Zibaee, Behjat Javadi, Zahra Sobhani, Maryam Akaberi, Faegheh Farhadi, Mohammad Sadegh Amiri, Hamed Baharara, Amirhossein Sahebkarf, Seyed Ahmad Emami,(2023). Cassia species: A review of traditional uses, phytochemistry and pharmacology. Pharmacological Research - Modern Chinese Medicine,9:1-65.

Amiri,M.S., Joharchi,M.R. and TaghavizadehYazdi, M.E.(2014). Ethno-medicinal plants used to cure jaundice by traditional healers of Mashhad, Iran. Iran. J. Pharm. Res. 13:157.

Dave,H. and Ledwani,L,(2012). A review on anthraquinones isolated from *Cassia* species and their applications, Indian J. Nat. Prod. Resour., 3: 291-319.

Grace,M.H., Lategan,C., Graziose, R., Smith,P.J., Raskin,I., Lila,M.A. (2012). Antiplasmodial activity of the ethnobotanical plant *Cassia fistula*, Nat. Pro. Comm.,7: 1263-1266.

Rahmani,A.H.(2015). Cassia fistula Linn.: potential candidate in the health management, Pharmacognosy Res.,7(3): 217-224.

Shakywar, Y., Jain, A., Verma, M., Panwar, A.S, and Agarwal, A. (2011). Pharmacognostical properties and their traditional uses of *Cassia tora*. Int. J. Pharm. Biol. Arch.,2(5):1311-1318.

Seely, H.W. and Vandemark, P. J. (1981). *Microbes in Action: A Laboratory Manual of Microbiology*, 3rd ed., W. H. Freeman: San Francisco, USA, 1981.

Shaikh, R. and Syed, I. Z. (2015). Proximate and phytochemical analysis of *Cassia tora* leaves. J. Res. Pharm. Sci.,2(8):1-3.

Raaman, N.(2006). Phytochemical Techniques. Pitam Pura, New Delhi: New India Publishing Agency; 2006. pp. 9–24.

Harbone, J.B.(1973). Phytochemical Methods, Chapman and Hall, Ltd., London, p49-188.

Sahu, J., Koley, K.M. and Sahu, B.D. (2017). Attribution of antibacterial and antioxidant activity of *Cassia tora* extract toward its growth promoting effect in broiler birds. *Vet World*, 10(2):221-226.

Kamath, B. R., and Kizhedath, S. (2019). Invitro antibacterial activity of Cassia fistula Linn methanolic leaf extracts. *International Journal of Basic & Clinical Pharmacology*, 8(2):270-274.

Bhalodia,N.R. and Shukla, V.J. (2011). Antibacterial and antifungal activities from leaf extracts of *Cassia fistula* l.: An ethnomedicinal plant. J. Adv. Pharm. Technol. Res., 2(2):104-109.

Khyade,M.S., Kamble,S.P., Kurhe,A.R., Padwal,A.D.(2015). Comparative Fourier Transform Infrared Spectroscopic analysis and free radical quenching properties of three *Cassia* Species . Asian J Pharm Clin Res, Vol 8, Issue 5, 2015, 119-125

Kamath, B.R. and Kizhedath, S. (2019). Invitro antibacterial activity of *Cassia fistula* Linn methanolic leaf extracts. *International Journal of Basic & Clinical Pharmacology*, *8*(2), 270–274.

Sumathy,V., Zakaria,Z., Chen, Y., Latha,L.Y., Jothy,S.L., Vijayarathna, S. and Sasidharan, S. (2013). Evaluation of the effect of Cassia surattensis Burm. f., flower methanolic extract on the growth and morphology of Aspergillus niger.European Review for Medical and Pharmacological Sciences,2013; 17: 1648-1654.