



Anti-microbial activity of *Cassia tora* leaves and stems crude extract

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Abstract:

The present investigation is carried out to determine the anti-microbial activity of *Cassia tora* leaves and stem crude extracts at various concentrations. Agar well diffusion method is used to determine both anti-bacterial and anti-fungal activities. The phytochemical analysis was carried out to screen the presence of alkaloids, tannins and cardiac glycosides so as to establish its relation with antimicrobial activity. The phytochemical analysis of both extracts revealed the presence of alkaloids, cardiac glycosides, tannins and saponins. The anti-microbial activity of methanolic extract of leaves and stem produced significant inhibitory zones against various tested organisms. Among the bacterial strains *S.aureus* and *K. Pneumonia* exhibited highest susceptibility whereas, both the fungal strains showed susceptibility to the extracts.

Keywords: *Cassia tora*, phyto chemical analysis, zones of inhibition.

Introduction:

Plants are considered as factories of enumerable biologically active compounds which possesses various pharmacological properties ^[1-3]. In recent years, the increased rate of infections and development of multi resistant human pathogenic organisms against various antimicrobial drugs ^[4] has become a very big live threat, and poses an emergency to find out an alternative source of highly therapeutic natural drugs with no side effects which are the most common in the use of synthetic drugs ^[5].

Cassia tora (Leguminosae) is most widely found in India as a weed and a well known herb used in ayurvedic medicine. It exhibits various pharmacological properties viz., Laxative,

Antihelminthic, Ophthalmic, Liver tonic, Cardio tonic and Expectorant ^[6].

To the contrast of literature cited in the introduction about this plant, in the present investigation we tested few methanolic fractions of *cassia tora* leaf and stem crude extracts for the evaluation of phytochemical analysis and antimicrobial activities.

Material and methods:

The plant material was collected from the local areas of Hanamkonda, District Warangal. The plant has been authenticated by Prof. Thirupathiah, Department of Biotechnology, Chaitanya Post Graduate College (Autonomous), Hanamkonda, Warangal, A.P, India.

1. Preparation of Extracts:

The leaves and stem of *Cassia tora* were dried under shade and grinded in homogenizer to coarse powder. The powder (100 grams) was used for the extraction with methanol and dried under rotavapor at 40-50°C for 3 hours.

2. Chemicals:

Dragendorff's reagent, Agar-Agar type I (Bacteriological), is purchased from Hi-Theme chemical laboratories, Hyderabad. Other chemicals purchased were of research grade.

3. Bacterial and Fungal cultures:

The bacterial species selected were *Staphylococcus aureus* ATCC 96, *Bacillus subtilis* MTCC 441, *B. cereus* ATCC 9372, *Klebsiella pneumonia* MTCC 109, *Escherichia coli* ATCC 8739, *Salmonella paratyphi* ATCC 4420. Whereas fungal cultures

used were *Aspergillus niger* ATCC 9763, *Candida albicans* ATCC 7596.

All these strains were obtained from Department of Microbiology, Chaitanya Postgraduate College (Autonomous), affiliated to Kakatiya University, Warangal.

a. Phytochemical analysis:

The qualitative phyto chemical analysis of the crude extracts was performed by following standard methods described by [7-8]. (Harborn JB *et al.*, 1988, Kokate CK 2005).

b. Antibacterial activity:

The antibacterial activity testing of the selected cultures was carried out according to the method described by Perez.*et.al* [9] with slight modifications. Each selective medium was inoculated with the microorganism suspended in nutrient broth. Once the agar was solidified, it was punched with the wells of six millimeters diameter and was filled with 25 µL of the plant extracts and some were kept as blanks (Sterilized distilled water,). Gentamycin sulfate and Nystatin were used as positive controls at a concentration of 10µg/ml respectively. The dilution medium for the positive control was sterile distilled water. The plates were incubated at 35 ± 2°C for 24 hrs and the antimicrobial activity was observed and calculated.

c. Antifungal activity:

The same method as used for bacteria was adapted to determine the antifungal activity. Sabourauds agar was used as the medium for fungal cultures. The inoculated medium was incubated at 25°C for 4 days for both *Aspergillus niger* and *Candida albicans*.

Results and Discussion:

Table 1: Phytochemical analysis of cassia *tora* leaf and stem methanolic extract.

Plant constituents	Stem bark	Leaves
Alkaloids	+	-
Steriods	+	+
Cardiac glycosides	+	+
Saponins	+	-
Tannins	+	+

+ indicates the presence of correspondent Plant constituent.

The anti-bacterial activity of methanolic extracts of leaves and stem exhibited significant inhibitory effect towards various tested organisms (Table. 2). Among gram positive and negative strains, *S.aureus* and *K. pneumonia* produced highest inhibitory zones 12, 15, 12, 20, and 13, 15, 17, 23 at 100 and 200 µg/ml of leaves and stem methanolic extracts, respectively. The anti-fungal activity of both extracts also produced significant inhibitory zone against *A. niger* and *C. albicans*. The inhibitory zones of *A. niger* and *C. albicans* are 20, 13 and 7, 5 which are noticed at 100 and 200 µg/ml towards leaves and stem methanolic extracts, respectively (Table. 2). The antibacterial and anti-fungal activities are compared with known standards such as gentamycin and nystatin. The inhibitory zones which are obtained with standards are 25, 29 and 23, 18 towards *S.aureus*, *K. pneumonia* and *A. niger* and *C. albicans* respectively (Table. 2).

Table 2: Antimicrobial activity of *cassia torra* Leaf and stem methanol extract.

Test organisms	Leaves		Stem		Gentamycin	Nystatin
	100#	200#	100#	200#	10	10
<i>S.aureus</i>	12	15	12	20	25	NA*
<i>B. subtilis</i>	10	11	14	15	23	NA*
<i>B.Cereus</i>	8	10	12	13	21	NA*
<i>E.Coli</i>	6	7	9	12	20	NA*
<i>S.P. typhi</i>	8	11	15	17	24	NA*
<i>K. neumonia</i>	13	15	17	23	29	NA*
<i>Aspergillus niger</i>	7	10	12	20	NA*	23
<i>Candida albicans</i>	5	9	11	13	NA*	18

NA* it indicates that it is not applicable

The literature survey, of this plant revealed that stems have been not utilized for the evaluation for both anti-bacterial and anti-fungal activities [10, 11, and 12]. Therefore, with this reference, we investigated pharmacological properties of *C. tora* stem methanolic extract, which were compared with methanolic extract of leaves. The investigation reports reveals that the stem extract noticed highest anti-bacterial and anti-fungal activity than the leaves. The leaf methanolic extract fails to produce inhibitory effect on *S. paratyphi* whereas, the methanolic stem extract exhibited significant inhibitory effect against *S. paratyphi* [13]. The phytochemical analysis of methnolic leaf extracts revealed that it does not possess alkaloids, which are noticed with stem methanolic extracts [10]. This might be one of the reasons considered for susceptibility shown with methanolic stem extract and don't with leaf extract [14]. It was found that the anti-fungal activity of stem methnolic extract is also high than the leave extract, this might be because the stem extract noticed to contain saponins which were not found with leaf extract thus, it is understood that saponins play a significant role as anti-fungal agents [15].

Conclusion:

The methanolic extracts of *C. torra* leaves and stem showed significant antimicrobial properties at various concentrations against all the tested bacterial strains.

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