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A study on antimicrobial activity of *Cleome rutidosperma* DC

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Abstract

Objective: To study the antimicrobial activity of the ethanolic extract and its various fractions of *Cleome rutidosperma* DC. Materials and methods : Minimum inhibitory concentration of the extract was performed by broth dilution method against both for the bacterial and fungal strains. Results : The results of MIC study revealed the antimicrobial activity of the ethanolic extract and its different fractions against the tested strains of microorganisms. The activities were found to be potentiated by fractionation of mother extract (ethanolic extract) with highest activity for diethyl ether fraction. Conclusion : The present study indicates the potential usefulness of *C. rutidosperma* in the treatment of various pathogenic diseases.

Key words : *Cleome rutidosperma* DC, Antibacterial activity, Antifungal activity, Minimum inhibitory concentration.

1. Introduction

Cleome rutidosperma (family: Capparidaceae) is a low-growing herb, up to 70 cm tall, found in waste grounds and grassy places with trifoliate leaves and small, violet-blue flowers, which turn pink as they age. The elongated capsules display the asymmetrical, dull black seeds. The plant is native to West Africa, from Guinea to Nigeria, Zaire and Angola. It has become naturalized in various parts of tropical America as well as Southeast Asia [1, 2]. According to traditional use, the different parts like leaves, roots, seeds of the plants of *Cleome* genus are used as stimulant, antiscorbutic, anthelmintic, rubifacient, vesicant and carminative [3]. The antiplasmodial activity of the chloroform – methanol (1:1) extract of leaves was reported earlier [4]. Although, no work regarding antimicrobial activity has been reported on *Cleome rutidosperma*, some other plants of this genus have been reported to possess antimicrobial properties [5-9]. In the present

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study, we report the antimicrobial activity of ethanol extract and its fractions of the aerial parts of *C. rutidosperma*.

2. Materials and Methods

2.1. Plant material

The plant was identified by the taxonomists of Botanical Survey of India, Shibpur, Howrah. After authentication, fresh aerial parts were collected in bulk from young matured plants at the rural belt of Salipur during September, 2005 washed, shade dried and then milled in to coarse powder by a mechanical grinder. The powder was passed through sieve number 40 and used for further studies.

2.2. Preparation of extract

The powdered plant material was extracted with 90% ethanol using Soxhlet apparatus. The solvent was removed under reduced pressure, which gave a greenish-black coloured sticky residue (yield- 12.1% w/w on dried material basis). A portion of dried ehanolic extract was suspended in water and fractionated successively with petroleum ether (40-60°C), diethyl ether, ethyl acetate and n-butanol. The yields of the fractions were found to be 26.64%, 8.95%, 6.39%, and 16.33% respectively of the ethanolic extract. All the fractions were dried by distillation under reduced pressure. Standard methods [10, 11] were used for preliminary phytochemical screening of the ethanolic extract and its various fractions to know the nature of phytoconstituents present in it. The extracts were then dissolved with dimethyl sulfoxide (DMSO) for antimicrobial study.

2.3. Microorganisms used

For the present study, the microorganisms used include *Staphylococcus aureus NCTC 8530, Streptococcus faecalis S1, Bacillus polymexia 474, Bacillus subtilis UC 564, Pseudomonas aerugenosa 25619, Vibrio cholerae 824, Salmonella typhi 59, Shigella flexiniry ATCC 2457T, Aspergillus niger AB 41, Penicillum notatum ATCC 11625* and *Candida albicans ATCC 18804* respectively. Suitable strains of these microorganisms were procured from the microbiology laboratory of our institute.

2.4. Antimicrobial Activity

2.4.1. Determination of Minimum inhibitory concentration (MIC)

Minimum inhibitory concentration (MIC) of the extract was performed by broth dilution method [12] at concentrations of the extract ranging from 25 µg/ml to 500 µg/ml in DMSO against all the test microorganisms (Table 1).

Table 1. MIC (µg/ml) values of extracts of *C. rutidosperma*.

Extract	***S. aureus***	***S. faeclis***	***B. poly-mixa***	***B. subtilis***	***P. aeruge-nosa***	***V. cholerae***	***S. Typhi***	***S. flexineri***	***A. niger***	***P. notatum***	***C. albicans***
Ethanolic extract	>500	>500	>500	250	250	>500	>500	>500	>500	>500	>500
Pet ether fraction	>500	>500	250	250	125	250	250	250	250	>500	>500
Diethyl ether fraction	250	125	125	125	100	100	250	125	250	125	250
Ethyl acetate fraction	250	>500	>500	250	>500	>500	>500	250	125	>500	250
n-Butanol fraction	>500	>500	>500	>500	250	250	250	>500	250	125	125

All values are average of three determinations

3. Result and discussion

The results of MIC study revealed the antimicrobial activity of the ethanolic extract and its different fractions against the tested strains of microorganisms. The activities were found to be potentiated by fractionation of mother extract (ethanolic extract) with highest activity for diethyl ether fraction.

Preliminary phytochemical studies revealed the presence of lipids, steroids, terpenoids, flavonoids, tannins, saponins, sugars in the mother ethanolic extract. Pet-ether, diethyl ether, ethyl acetate and n-butanol fractions were respectively found to contain lipids, steroids, terpenoids; steroids, terpenoids, flavonoids; flavonoids, tannins, saponins and flavonoids, tannins, saponins. Presence of constituents like flavonoids, tannins, triterpenoids in the extracts as reported earlier are likely to be responsible for the observed antimicrobial activity [13-16]. Potentiation of the activity by fractionation gives a rationale for the further sub-fractionation for isolation of active constituents responsible for the reported activity.

Further study regarding the isolation and characterisation of the active constituents responsible for such activity is currently under progress from the most active fraction (diethyl ether fraction).

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