International Standard Serial Number: 0976 – 139X

Deccan J. Pharmacology 1(4): Oct-Dec 2010

DECCAN PHARMA JOURNAL SERIES

ARMS Online Publications

www.deccanpharmajournals.com

(Research Article)

Received; accepted

ANTIMICROBIAL ACTIVITY OF *CAPPARIS ZEYLANICA LINN.* LEAF

Somnath De*[1], S.Aneela[1], Kausik Bhar[1], Lakshmi kanta Kanthal[2], K.Satyavathi[2], S.Ashutosh Kumar[3], S.Manidipa[3]

1. Dr. Samuel George institute of Pharmaceutical sciences, Markapur, A.P., India
2. Koringa College Of Pharmacy, Korangi, A.P., India
3. A.K.R.G College of Pharmacy, Nallajerla, A.P., India

Keywords:

Capparis zeylanica L, antimicrobial activity, Indian caper

For Correspondence:

Somnath De

Dr.Samuel George Institute of Pharmaceutical Sciences, Markapur, Prakasam (dist), A.P, India

E-mail:

somnath.bankura@gmail.com

ABSTRACT

The present study was designed to screen antimicrobial activity of Capparis zeylanica Linn. The coarse material of C. zeylanica leafs was successively extracted with petroleum ether,chloroform and methanol using Soxhlet and macerated to form water extract. All extracts were screened for its antibacterial activity using agar well diffusion method. Before testing of these extracts for antimicrobial activity, they were completely dried at normal conditions. It was dissolved in DMSO((Dimethyl sulphooxide) and diluted with sterilized water, prepared the stock solutions of each extract of different concentrations. For evaluation of antimicrobial activity(for test), three cultures were used amongst which two were Gram-positive bacteria, one was Gram-negative bacteria. The microorganisms used for antibacterial activity were *Bacillus subtilis*, *Escherichia coli* and *Pseudomonous fluorescens.* Standard antibiotic Gentarnycin (10 g/ml) was used as a positive control for antibacterial. Petroleum ether, chloroform, ethanol and water extract exhibited in-vitro antibacterial activity. None of the extracts showed antifungal activity.

Introduction:

Medicinal herbs are an indispensable part of the traditional medicine practised all over the world because of low costs, easy access and ancestral experience (Machado et al. , 2003). Capparis zeylanica Linn. (Capparidaceae), commonly known as Indian caper, is a climbing shrub found throughout India and has been used as a 'Rasayana' drug in the traditional Ayurvedic system of medicine. In North India, the leaves are widely used as counter-irritant, febrifuge and as a cataplasm in swellings and piles (Kirtikar and Basu, 1987). Capparis species has been reported to have antihelmintic, antimicrobial (Mali et al., 2004) and anti-inflammatory (Chaudhary et al. , 2004) activities. We found relevant literature substantiating the uses indicated. Modern phytochemical screening of the plant has shown the presence of fatty acids (Haque et al. , 2004), flavonoids (Sabhi et al. , 1985) and alkaloids (Cordell, 1981) in its leaves. An attempt was made to evaluate the antimicrobial activity of different extracts of C. zeylanica leafs.

PLAN OF WORK

Plant identification

↓

Prepared coarsely powder

↓

Using extract, methanol, ethanol, water as a solvent by soxhiletion

↓

Phytochemical testing

↓

Extract is evaporated to dryness

↓

And used to study the antimicrobial activity

↓

Gram +ve Gram -ve

↓

Zone of Inhibition

↓

Compared with standard antibiotics

Materials and methods:

Collection and authentication of plant material

The leaves of *C. zeylanica* were collected from Indian Institute of Botanical Sciences, Kolkata, and authenticated by Taxonomist of Indian Institute of Botanical Sciences, Kolkata. After authentication the leaves taken from plant ; the extraction process is carried out by **soxhlet** apparatus.

Preparation of Extracts:

The leaves were collected, cleaned and shade-dried. The dried leaves were pulverized by a mechanical grinder and passed through a 20-mesh sieve. A powdered leaves (500 g) was extracted successively with petroleum ether, chloroform and ethanol using a Soxhlet apparatus and water extracted by cold maceration. The extraction was carried out for 24 h at room temperature with mild shaking (Chopra *et al*, 1992). The extracts were filtered and concentrated at 45°C, and the weight of each residue was recorded and percent yield was calculated.

Screening for Antibacterial and Antifungal Activity

The antibacterial activity was evaluated by employing 24-h cultures of *Bacillus subtilis*, Escherichia *coli* and *Pseudomonas fluorescens*. Activity of abovementioned extracts was tested separately using agar well diffusion method. The bacterial strains employed in the study were obtained from Dr.Samuel George Institute of Pharmaceutical Science (Dr.SGIPS), AP. The medium was sterilized by autoclaving at 120°C (15 lb/in 2). About 30 ml of nutrient agar medium inoculated with the respective strains of bacteria and fungi was transferred aseptically into each sterilized Petri plate. The plates were left at room temperature to allow solidification. In each plate, a single well of 6-mm diameter was made using a sterile borer. The extracts were freshly reconstituted with suitable

solvents (dimethyl sulphoxide) and tested at various concentrations. The test sample and the control (0.2 ml) were placed in 6-mm diameter well. Antibacterial assay plates were incubated at 37 ± 1°C for 24 h. A standard disc (6-mm diameter) with antibiotic Gentamicin (10 µg/ml) was used as positive antibacterial control. Each experiment was carried out in triplicates, and diameter of the zone of inhibition surrounding each well was recorded.

Results and Discussion:

Table no. 1

Result of in vitro antimicrobial activity against Bacillus subtilis to determine MIC value

TEST SAMPLES	**CONC.mg/ml**	**Zone of inhibition in mm*(±)S.D.**
Gentamycin	10[a]	17.00±1.55
Water extract	6.1	13.66±1.82
Methanol extract	4.2	15.33±0.53
Petroleum ether extract	10.4	13.00±1.00
Chloroform extract	8.6	12.00±1.00

* values are the mean of three assays.

DMSO was used as control and did not show any zone of inhibition

a : µg/ml

Table no. 2

Result of in vitro antimicrobial activity against Pseudomonous flourescens to determine MIC value

TEST SAMPLES	CONC.mg/ml	Zone of inhibition in mm*(±)S.D.
Gentamycin	10[a]	17.00±1.55
Water extract	4.4	15.66±0.57
Methanol extract	10.8	13.00±1.00
Petroleum ether extract	18.4	12.00±1.00
Chloroform extract	6.2	14.00±2.00

* values are the mean of three assays.

DMSO was used as control and did not show any zone of inhibition

a : µg/ml

Table no. 3

Result of in vitro antimicrobial activity against Escherichia coli to determine MIC value

TEST SAMPLES	CONC.mg/ml	Zone of inhibition in mm*(±)S.D.
Gentamycin	10[a]	16.00±1.00
Water extract	6.0	12.00±0.68
Methanol extract	4.8	15.00±0.60
Petroleum ether extract	6.4	13.00±1.00
Chloroform extract	8.2	12.66±1.15

* values are the mean of three assays.

DMSO was used as control and did not show any zone of inhibition

a : µg/ml

Table no. 4

Summary of Antibacterial acitivity of C. zeylanical levels extracts against microorganism

Sample	Conc. Mg/ml	Zone of inhibition in mm* (±) S.D.		
		B.s.	**P.f.**	**E.c.**
PTE	18.4	13.00 ± 1.00	12.00 ± 1.00	13.00 ±1.00
CHE	8.6	12.00 ±1.00	14.00 ± 2.00	12.66 ±1.15
MEE	10.8	15.33 ±0.53	13.00 ±1.00	15.00 ± 0.60
AQE	6.0	13.66 ±1.00	15.66 ± 0.57	12.00 ± 0.68
GEN	10[a]	17.00 ±1.15	17.66 ±0.57	16.00 ±1.00

a:µg/ml

* Values arre the mean of three assays

PTE – Petroleum ether extract MEE – Methanolic extract ,

CHE – Chloroform extract GEN- Gentamycin, AQE – Water extract,

B.S – Bacillus. Subtilis P.F – Pseudomonous Flourescens ,

E.C – Escherichia Coli

Table no. 5

Summary of minimum inhibitory concentration of C.zeylanica leaves extract against different microorganism

Sample	Minimum inhibitory concentration in mg/ml*		
	B.s.	**P.f.**	**E.c.**
PTE	10.4	18.4	6.4
CHE	8.6	6.2	8.2
MEE	4.2	10.8	4.8
AQE	6.1	4.4	6.0

a:µg/ml

* Values arre the mean of three assays

PTE – Petroleum ether extract MEE – Methanolic extract

CHE – Chloroform extract ,

GEN- Gentamycin , AQE – Water extract

B.S – Bacillus. Subtilis P.F – Pseudomonous Flourescens ,

E.C – Escherichia Coli

Conclusion:

The plane extracts employing different solvents were subjected to evaluation of anti-bacterial activity. The microorganism used Pseudomonous flourescens, Bacillus subtilis, Escherichia coli, The antimicrobial activity was performed by using Agar-disc diffusion methods. The extracts

were freshly reconstituted with DMSO, (Dimethyl sulphooxide) and tested at various concentration, DMSO was used as a blank against different microorganisms. The bacterial assay plates were incubated at 270C for 24 hrs.. Standard antibiotic Gentarnycin (10 □g/ml) was used as a positive control for antibacterial. Each experiment was performed in triplicate' and mean diameter of zone of inhibition was calculated. All the extracts showed antimicrobial activity; hence extracts were subjected to determine MIC value. Serial Two Fold Dilution methods were used for determine the MIC values of each extract. All extracts exhibit the inhibition of growth of different bacteria. In terms of specific inhibition, petroleum ether extract showed zone of inhibition in the range of 11.66 mm to 13.00 mm at 18.4 mg /ml concentration, chloroform extract showed rang of 11.66 mm. to 14.00 mm at 8.6 mg/ml concentration, methanol extract showed range of 12.66 mm to 15.00 mm. at 10.8 mg/ml concentration and water extract showed range of 13.00 mm, to 15.66 mm at concentration 6.0 mg/ml, comparable to standard Gentamycin showed 16 mm to 17.00 mm at 10 □g/ml concentration against different Gram positive bacteria, Gram negative bacteria so co joint the use of medicinal plant (naturally occurring antimicrobial) and antibiotics may prove useful in future medical practice.

Reference:

1. Adikaran, N. K. B., Ewing, D. F., Karunatne, A. M. and Wijeratne, E. M. K., 1992. Antifungal compound from immature avocado peel. Phytochemistry, 31(l),93-96.
2. Agarwal, A., 2005. Critical issues in Quality Control of Herbal Products, Pharma Times, 37(6), Pp 09-11.
3. Anon, J. W. 1987. The research for new drugs from natural sources. Pharmacy Times, 50, 32-39.

4. Asolkar, L.V., 1982. Glossary of Indian Medicinal Plants with active Principle. CSIR Publications, New Delhi. Pp. 167
5. Bhanu P. S., Sagar, T. K. and R. Zafer., 2003. Failure and successes of Herbal Medicines, The Indian Pharmacist, 17-23.
6. Chakravarthy, B. K., 1993. Standardization of Herbal products. Indian. J. Nat. Product, 9, 23-26.
7. Chaudhari, R. D., 1996. Herbal drug industry, 1st Edn., Eastern Publisher, New Delhi, 498-499.
8. haudhary SR, Chavan MJ and Gaud RS, Anti-inflammatory and analgesic activity of *Capparis zeylanica* root extracts, Indian Journal of Natural Product, 2004, 20(1), 36-39.
9. Chaudhary, S. R., Chavan, M. J. and Gaud, R. S., 2004. Anti-inflammatory and analgesic activity of Capparis zeylanica root extracts, Indian J. of Nat. Product, 20 (1),36-39.
10. Chopra RN, Nayar SL and Chopra IC, Glossary of Indian Medicinal Plants, CSIR Publications, New Delhi, 1992, 50.
11. Cordell GA. Introduction to the Alkaloids Biogenetic approach. John Wiley and Sons Publication, New York, 1981, 892.
12. Ekramul Haque, M Mohmud, Haque, Mukhlesur, Raheman and Satyajit DS, E-Octodec-7-en-5 ynoic acid fromCthe root of *Capparis zeylanica* , Fitoterapia, 2004, 75, 130-133.
13. El-Seedi, H. R., Sata, N., Torssell, K. B. and Nishiyarna, S., 2002. New Labdene Diterpenes from Eupatorium glutinosum, J. of Nat. Products, 65, 728-729.

14. Florey HW, Chain E and Florey ME, The Antibiotic, Vol. I, Oxford University Press, New York, 1989, 576-628.
15. Hammond-Kosack, K. E. and Jones, J. G., 1996. Resistance gene-. dependent Plant defense response, Plant cell, 8, 1773 -179 1.
16. Kirtikar KR, Basu BD, Indian Medical Plants, Vol I, International Book Publication Distrubution, Dehradun, 1987, 195-201.
17. Mali RG, Hundiwale JC, Sonawane RS, Patil RN, Hatapakki BC, Evaluation of *Capparis deciduas* for Anthelmintic and Anti-microbial activities, Indian Journal of Natural Product, 20(4), 2004, 10-12.