Research Article

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ANTIMICROBIAL PROPERTY OF *ERVATAMIA CORONARIA* STAPF., LEAVES

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Abstract: The present study was carried out to investigate the antimicrobial property of methanolic extract of *Ervatamia coronaria* Stapf., leaves (MEEC), by agar disc diffusion method. Three gram negative and three gram positive bacteria and two fungal strains were used for the present study. The MEEC concentration ranging between 100-1000µg/ml showed inhibitory activity against all the tested bacteria. The extract also showed significant antifungal activity against the tested strains. All the tested microorganisms showed dose dependent susceptibility towards the methanolic extract of *Ervatamia coronaria*. Based on the present findings it may be concluded that the methanolic extract of *Ervatamia coronaria* possess potent antimicrobial activity.

Keywords: Antimicrobial, antifungal, methanolic extract, *Ervatamia coronaria*

INTRODUCTION

With the evolution of resistance genes to antibiotics of microbial origin[1,2] and nonantibiotics chemicals[3] plant materials have become the subject of public attention[4,5]. A number of antimicrobial compounds of microbial origin have been clarified with regard to their mechanisms of action and this has resulted in the discovery of new drugs[6,7]. On the other hand, inspite of various numbers of antimicrobial phytochemicals[8,9], their action sites were rarely described. Like antibiotics, antimicrobial phytochemicals also have mechanisms of action including inhibition of nucleic acid synthesis[10], inhibition of respiration[11], cell membrane damage[12] and cell wall synthesis[13].

Most of the folkloric claims agree in the traditional use of the herb for treatment of diseases on known bacterial etiology. However, there is apparently less scientific report on the antibacterial properties of the plant. Such lack of scientific knowledge has often constituted a major constraint to consideration of the use of traditional herbal remedies in conjunction with or as an affordable alternative to orthodox medical treatment. Thus the present investigation is carried out to evaluate the antimicrobial potency of the methanolic extract of the leaves of *Ervatamia coronaria* (MEEC).

MATERIALS AND METHODS

Microorganisms:

Bacillus subtilis (ATCC 6633 Gram positive), *Staphylococcus aureus* (ATCC 6538 Gram positive), *Micrococcus luteus* (ATCC 10240 Gram positive), *Escherichia coli* (ATCC 9837 Gram negative), *Pseudomonas aureginosa* (ATCC 9027 Gram negative), *Salmonella typhimurium* (ATCC 43579 Gram negative) were used to determine antibacterial activity. Fungal organisms such as *Aspergillus niger* (ATCC 16404), *Candida albicans* (ATCC 10231) strains were also employed for the determination of antifungal activity.

Bacteria and fungi were obtained from the stock cultures of the Central Drugs Laboratory (CDL), Kolkata, and Indian Institute of Chemical Biology (IICB), Kolkata. The bacterial and fungal stock cultures were maintained on Muller Hinton agar and Sabouraud-dextrose agar slants respectively, which were stored at 4°C. Eight microorganisms maintained on nutrient agar base were used to assess the antimicrobial activity of the plant extracts. The fungi were maintained on Sabouraud-dextrose agar, which is often used with antibiotics for the isolation of pathogenic fungi.

Antimicrobial screening:

Agar cultures of the test microorganisms were prepared as described[14]. Three to five similar colonies were selected and transferred to 5 ml broth with a loop and the broth cultures were incubated for 24 hr at 37°C. The MEEC was dissolved in dimethyl sulfoxide with a magnetic stirrer. For screening, sterile 6-mm diameter filter paper discs were impregnated with 100-1000µg of MEEC and then placed in Muller Hinton agar medium. The inoculum for each organism was prepared from broth cultures. The concentration of cultures was to $1x10^5$ colony forming units/ml. The results were recorded by measuring the zones of growth inhibition surrounding the disc. Clear inhibition zones around the discs indicate the presence of antimicrobial activity. All data regarding antimicrobial activity are the average of triplicate analyses. The antibacterial amikacin (10µg/ml) and antifungal

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griseofulvin (20µg/ml) were used as reference standards as recommended by the National Committee for clinical laboratory standards.

Statistical Analysis:

Data are reported as the mean ± S.D of three measurements. Statistical analysis was performed by student *t* test.

RESULTS AND DISCUSSION

The results were summarized in Table 1. The present study indicates that the methanol extract of *Ervatamia coronaria* leaves showed broad spectrum of activity against all the bacterial strains at the tested concentration (100-1000µg/ml).

Table.1: Antibacterial activity of methanol extract of *Ervatamia coronaria* leaves (MEEC) and standard antibiotic

Samples	Conc. (µg/ml)	Diameter of zone of Inhibition (mm)					
		BS	SA	ML	EC	PA	ST
MEEC	100	8.90±0.50	12.10±0.90	-	-	-	-
	250	9.80±0.60	13.00±1.80	6.60±0.20	9.40±1.10	9.10±1.10	-
	500	17.60±0.50	17.50±0.70*	9.20±1.90	12.00±1.40	13.10±1.00	8.80±1.00
	1000	20.30±1.20	22.90±1.00	13.40±0.60	16.80±0.40	19.50±0.90	12.30±1.40
Amikacin	10	24.20±0.60	22.80±1.00	17.40±1.00	19.30±0.60	23.40±1.40	22.30±0.60

-; No Inhibition zone; BS-*Bacillus subtilis*, SA-*Staphylococcus aureus*, ML- *Micrococcus luteus*, EC- *Escherichia coli*, PA- *Pseudomonas aureginosa*, ST-*Salmonella typhimurium*

Values are mean ± S.D (mm) of three separate experiments; Statistical value *P<0.05 when compared to standard.

It is well reported that some classes of the phytoconstituents and their metabolites such as alkaloids, saponins, cyanogenetic glycosides, diterpenes and steroids found to possess broad spectrum of antibacterial activity[15].

Table.2: Antifungal activity of methanol extract of *Ervatamia coronaria* leaves (MEEC) and standard antibiotic

Samples	Conc. (µgml^{-1})	Diameter of zone of Inhibition (mm)	
		AN	CA
MEEC	100	8.30±0.82	14.05±0.80
	250	9.50±1.30	17.24±0.70
	500	10.80±0.42	22.40±0.30
	1000	17±1.10	23.10±0.90
Griseofulvin	20	21.40±0.80	22.80±1.10

AN- *Aspergillus niger*, CA- *Candida albicans*.

Values are mean ± S.D (mm) of three separate experiments.

Thus the data obtained from the *invitro* studies of the methanolic extract of *Ervatamia coronaria* exhibited broad spectrum of antibacterial activity against the strains. Thus, the extract of *Ervatamia coronaria* preparations will be efficient against many diseases like diarrhoea, wound infections, food poisoning associated with etiologic agents such as strains of *E. coli, Salmonella species, S. aureus, P. aeruginosa* and *B. subtilis.*

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