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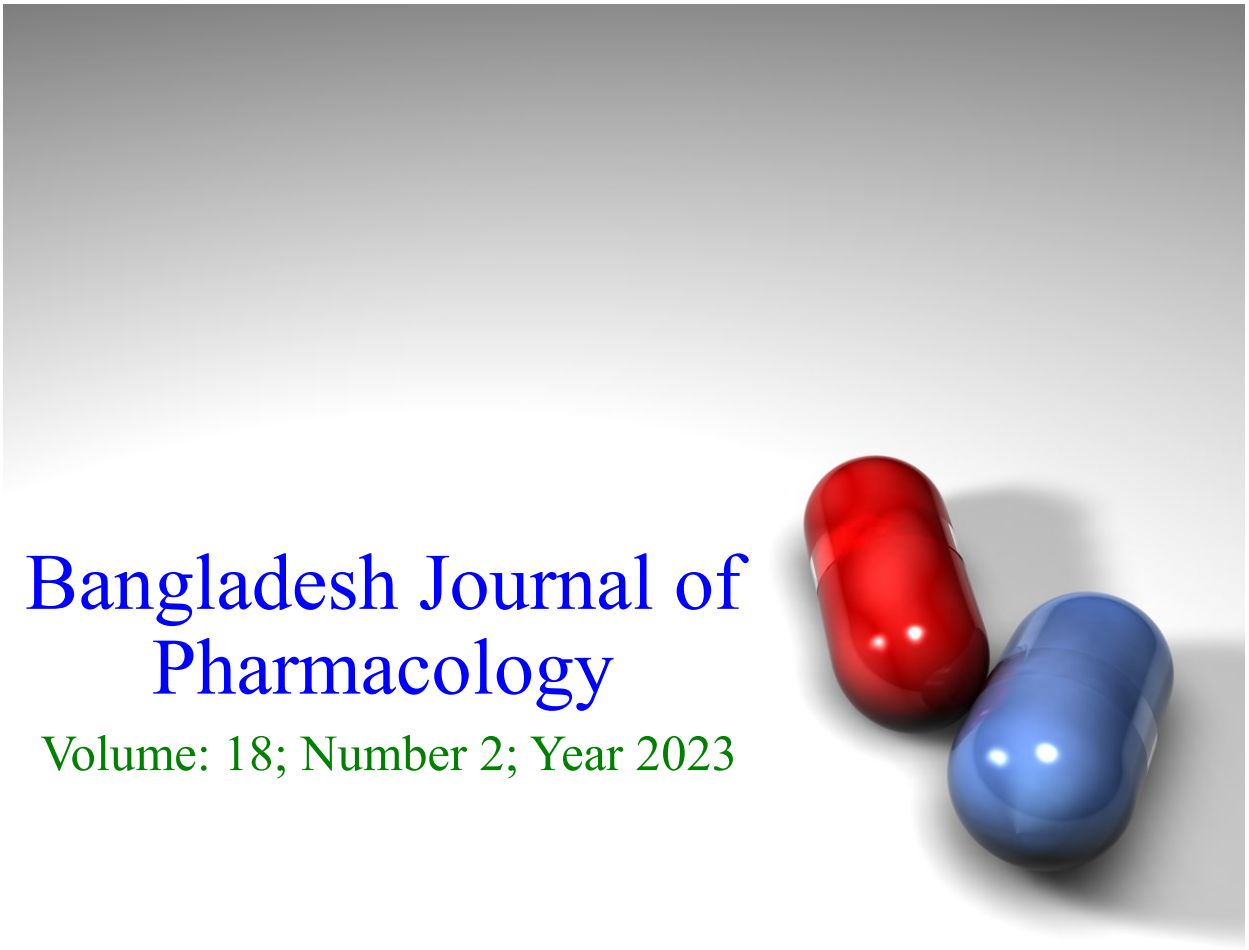

Bangladesh Journal of Pharmacology

Volume: 18; Number 2; Year 2023

Cite this article as: Shankar S, Ravi ND, Sathiavelu M. Antibacterial activity of *Calathea insignis*. Bangladesh J Pharmacol. 2023; 18: 75-76.

A Journal of the Bangladesh Pharmacological Society (BDPS)
Journal homepage: www.banglajol.info; www.bdpsjournal.org
Abstracted/indexed in Academic Search Complete, Agroforestry Abstracts, Asia Journals Online, Bangladesh Journals Online, Biological Abstracts, BIOSIS Previews, CAB Abstracts, Current Abstracts, Directory of Open Access Journals, EMBASE/Excerpta Medica, Global Health, Google Scholar, HINARI (WHO), International Pharmaceutical Abstracts, Open J-gate, Science Citation Index Expanded, SCOPUS and Social Sciences Citation Index
ISSN: 1991-0088; DOI: 10.3329/bjp.v18i2.64676

Letter to the Editor

Antibacterial activity of *Calathea insignis*

Sir,

Calathea insignis (also known as *C. lancifolia*, *Goeppertia insignis*, and *G. lancifolia,* and *Maranta insignis*) is a flowering plant native to South America. Its leaves are narrow, erect, lance-shaped yellowish green colour with dark alternating patches and are dark reddish-purple on the lower side. It is used as an ornamental plant because of the colour, shape, and pattern of the leaves (Nguyen et al., 2018). Methanolic extract of the plant *C. zebrine* has shown good antibacterial activity against bacterial pathogens like *Staphylococcus aureus* (9 mm), *Escherichia coli* (17 mm), *Streptococci* sp (17 mm), and *Proteus vulgaris* (17 mm) where erythromycin is used as a control. It has a reducing power activity of about 83 mg/mL (Sethi et al., 2015). This study is aimed at evaluating the phytochemical and antibacterial activity of the leaf extracts of the *C. insignis* plant against bacterial pathogens by using the agar well diffusion method. This is the first study using the extracts of the *C. insignis* plant.

The fresh and healthy leaves of the plant were collected from Thotta kalai nursery garden, ECR, Chennai, Tamilnadu, India. The leaves of the plant were washed well with tap water to remove dust particles and dried without sunlight for 2 weeks. After drying, the leaves were powdered using an electric blender. Solvents like methanol and ethyl acetate which have different polarities were used for the extract preparation. About 1 g of the leaf powder was soaked in 100 mL of each solvent in a conical flask and sealed well using parafilm. It is kept in a shaker of 120 rpm for 48 hours. After 48 hours the extracts were filtered using Whatman filter paper No. 1 and evaporated for one week to obtain the crude extracts.

Phytochemical screening of the leaf extracts were done according to the protocol (Shankar et al., 2018). The antibacterial activity of the leaf extracts was investigated against *Klebsiella pneumoniae*, *E. coli, Streptococcus pneumoniae*, and *S. aureus* by using the agar well diffusion method. The pathogens were stock cultured in nutrient broth. The bacterial culture to be tested was spread on freshly prepared Muller Hinton agar plates with a sterile cotton swab moistened with bacterial culture. By using a sterile cork borer, wells were made in the agar plates and loaded with 100 µL of leaf extract at different concentrations (100, 50, 25 µg/mL), and streptomycin antibiotic disc was used as a positive control. The plates were incubated at 37ºC for 24 hours and after the incubation period, the zone of inhibition was measured (Sundar et al., 2019).

Phytochemical analysis of the leaf extracts indicated the presence of phenol, saponins, and tannins and the absence of flavonoids and terpenoids (Table I). The plant *C. zebrine* showed the highest percentage of tannins (23 mg/mL) and phenolic content (24.3 mg/mL) (Sethi et al., 2015). The ethanolic extract of *Anthurium andraeanum* stem showed the presence of phytochemicals like tannin and alkaloid along with significant antibacterial activity against *Bacillus cereus* (10 mm), *K. pneumonia* (12 mm) and *E. coli* (13 mm). (Shazhni et al., 2016). Qualitative screening of phytochemical components of *Plumbago zeylanica* leaves revealed the presence of phenolics, alkaloids, flavonoids, and tannins, etc., and also the alcoholic leaf extract of the plant *P. zeylanica* showed good inhibitory activity against *Pseudomonas aeruginosa* (17 mm), *E. coli* (16 mm), *B. subtilis* (11 mm) and *S. aureus* (10 mm) at 100 mg/mL (Dhale and Markandeya, 2011). The aqueous extract of blue flowering *Silybum marianum* plant exhibits significant phenolic (0.413%) and tannin (0.693%) contents as well as the plant possess potential antibacterial activity against *B. subtilis* (17 mm), *P. vulgaris* (15 mm) and *S. aureus* (21 mm) (Shah et al., 2011).

Table I

Phytochemical screening of *Calathea insignis* leaf extracts

Phytochemicals	Methanol	Ethyl acetate
Flavonoids	-	-
Phenol	+++	+
Saponins	++	+
Terpenoids	-	-
Tannins	+	+++

+++ indicates highly positive; ++ indicates moderately positive; + indicates low positive; - indicates negative

Antibacterial activity was performed for methanol and ethyl acetate leaf extract of the plant *C. insignis.* The results of the agar well diffusion assay showed significant activity in both the leaf extracts against *S. aureus* (Table II). The zone of inhibition was highest

Table II

Antibacterial activity of *Calathea insignis* leaf extracts using agar well diffusion method

Extract	Concentration (µg/mL)	Organisms Zone of inhibition (mm)			
		Staphylococcus aureus	*Klebsiella pneumonia*	*Escherichia coli*	*Streptococcus pneumonia*
Methanol	25	15	-	-	-
	50	19	-	20	-
	100	23	-	25	-
Ethyl acetate	25	-	-	10	-
	50	25	-	-	-
	100	28	-	-	-
Standard (Streptomycin)	10 (mg)	18	28	20	25

in *S. aureus* with 28 mm at 100 µg/mL which is followed by 25 mm at 50 µg/mL in the ethyl acetate extract. Whereas, methanolic extract possesses good antibacterial activity against *S. aureus* (23 mm) and *E. coli* (25 mm) at 100 µg/mL. *S. pneumoniae* and *K. pneumoniae* did not show any activity in the extracts. The methanolic extract of *Diffenbachia* sp showed a significant antibacterial effect against *Cornybacterium diphtheriae* with 12 mm of the zone of inhibition (Chunduri et al., 2015). The methanolic extract of *D. penninervium* showed a 27 mm inhibition zone against *E. coli* (Kebede et al., 2021). This is the first report on phytochemical screening and *in vitro* antibacterial screening of *C. insignis* leaf extracts.

Financial support: Vellore Institute of Technology (SG ID: SG20220100)

Conflict of Interest: The authors declare that they have no conflict of interest.

Acknowledgment: The authors thank VIT, Vellore for providing a VIT seed grant for carrying out this research.

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