Bangladesh Pharmacological Society

Bangladesh Journal of Pharmacology

Volume: 18; Number 2; Year 2023

Cite this article as: Segaran G, Srinivasan C, Sathiavelu M. Antibacterial activity of *Calathea anulque.* Bangladesh J Pharmacol. 2023; 18: 77-78.

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.v18i2.64690

Letter to the Editor

Antibacterial activity of *Calathea anulque*

Sir,

The genus Calathea has about 300 species. These are well-known as pot plants owing to their ornamental leaves and many have been cultivated for their beautiful and exotic variegated foliage. One of the plants of this genus *Calathea zebrine* showed significant antibacterial activity against *Escherichia coli, Staphylococcus aureus, Streptococcus* sp., and *Proteus vulgaris* (Sethi et al., 2015). The antibacterial effect of *C. anulque* is not known. We selected *C. anulque* to evaluate its antibacterial activity and phytochemical constituents.

The healthy and fresh leaves of the *C. anulque* plant were collected in a sterile polyethylene bag from Thotakalai nursery garden, ECR, Chennai, Tamilnadu, India. The collected leaves were washed using tap water to eliminate the dust particles from the surface followed by Milli-Q water. They were stored for drying under the shade without exposure to sunlight for a week. The dried leaves were finely powdered using an electric blender. Two distinct solvents, methanol and ethyl acetate, were used for extraction purposes. About 1 g of finely powdered leaves samples were added to 100 mL of two different in a 250 mL Erlenmeyer flask. The flasks were sealed using parafilm and kept in a shaker for 48 hours at 120 rpm. After 48 hours, the extracts were collected by filtering through a Whatman filter paper No 1. The filtrates were evaporated using a rotary vacuum evaporator to attain dried crude extracts. The agar well diffusion method was carried out to determine the antibacterial activity of crude extracts against pathogenic organisms such as *Staphylococcus aureus* and *Streptococcus pneumoniae* (Gram positive bacteria), *Klebsiella pneumoniae* and *Escherichia coli* (Gram negative bacteria). The bacterial stock cultures were prepared using nutrient broth. For the antibacterial assay, the Mueller-Hinton agar plates were prepared. The suspended organisms were swabbed in the agar plates and the wells were made using the sterile cork borer. The 100 µL extracts of three different concentrations (100, 50, and 25 µg/mL) have loaded in the three wells and an antibiotic disc (streptomycin 10 mg) was used as a positive control. The test plates were incubated at 37°C overnight and clear zone development around the well was noted (Shankar and Sathiavelu, 2021).

The plant crude extracts were dissolved in dimethyl sulfoxide and used for phytochemical analysis. About 2 mL of 2% ferric chloride solution was added to the plant extract. The presence of phenol in the extract is indicated by the appearance of a blue-green to black color. The plant extracts were treated with 2 mL of 2% sodium hydroxide solution to identify the presence of flavonoids. The intense color change from yellow to colorless after the addition of diluted acid confirms the flavonoids. After the addition of 2 mL of concentrated sulfuric acid, the plant extract was heated until it evaporates. The presence of terpenoids was confirmed by the appearance of a greyish color. About 5 mL of distilled water was added to the test tube containing plant extract, and the contents were vigorously shaken. The presence of saponins was confirmed by the formation of stable foam (Segaran et al., 2020).

This is the first research conducted on *C. anulque*. A qualitative phytochemical analysis of extracts was done to analyze the active components present in the plants, revealing the presence of saponins and terpenoids (Table I). Both the plant crude extracts tested positive for antibacterial activity against *S. aureus* (Table II). The antimicrobial effect of ethyl acetate extract on *S. aureus* was more significant with the greatest inhibition zone of 28 mm. *S. aureus* was inhibited by a methanolic extract of *C. anulque* with an inhibition zone of 25 mm. Other three test pathogens (*S. pneumoniae, K. pneumoniae* and *E. coli*) were not inhibited by both the plant extracts.

Table I

Phytochemical screening of *Calathea anulque* leaf extracts

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

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

Previous research suggested that plants that thrive in low-light environments indoors might be useful for removing airborne microorganisms and toxins that are

Table II

Antibacterial activity of *Calathea anulque* 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	11	-	-	-
	50	20	-	-	-
	100	25	-	-	-
Ethyl acetate	25	-	-	-	-
	50	25	-	-	-
	100	28	-	-	-
Standard (Streptomycin)	10 mg disc	15	28	30	25

frequently found to pollute indoor air. The growth of *Corynebacterium diphtheriae* and *S. aureus* was inhibited by methanolic extracts of ornamental plants such as *Dieffenbachia* spp. and *Cordyline* spp. Microbe control may be influenced by volatile chemicals released by indoor plants such as *Cyperus alternifolius, Philodendron domesticum, Codiaeum variegatum,* and *Dieffenbachia camille* (Chunduri et al., 2015). Free radical scavengers such as phenolic compounds (such as coumarins, flavonoids, quinones, etc.), terpenoids, nitrogen compounds (such as alkaloids), and other metabolites are found in plants. Traditional medicine in Panama uses *C. warscewiczii* to treat a variety of illnesses. Aqueous and ethanol extracts of the ornamental plant *C. panamensis* have shown the presence of phytochemicals like alkaloids, monoterpenoids, and polyphenols. Non-flavonoid polyphenols from *C. panamensis* were found in its ethanol extract. The *C. panamensis* showed antiradical activity and has non-flavonoid polyphenolic compounds and alkaloid compounds in different solvent extracts (Rodriguez et al., 2008).

C. anulque shows low extent of antibacterial activity in comparison to *C. zebrine*. Phytochemical study shows that *C. anulque* contains no phenols and tannins. Whereas *C. zebrine* contains high concentration of phenols and tannins (Sethi et al., 2015).

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 Vellore Institute of Technology, Vellore for providing a VIT seed grant for carrying out this research

Gayathri Segaran, Chitrashalini Srinivasan and Mythili Sathiavelu

Department of Biotechnology, School of Bio Sciences and Technology, Vellore Institute of Technology, Vellore, India.

Corresponding author:

email: smythili@vit.ac.in

References

Chunduri JR, Jagtap P, Panchal S, Sagar S. Indoor ornamental plants and their antimicrobial properties. Int J Pharm Life Sci. 2015; 5: 246-49.

Rodriguez M, Hasegawa M, González-Mújica F, Motta N, Castillo A, Castillo J, Zea E, Mora K, Sousa L, González A, Camejo D. Antidiabetic and antiradical activities of plants from Venezuelan Amazon María Rodríguez. Rev Bras Farmacogn Braz J Pharmacogn. 2008; 18: 331-38.

Segaran G, Anitha UKPG, Sathiavelu M. Evaluation of antioxidant, total phenol and phytoconstituents of *Culvularia* sp., a fungal endophyte of *Boerhaaviadiffusa*. Res J Biotech. 2020; 15: 117-22

Sethi S, Khanna S, Khan A, Hatti N. Evaluation of antimicrobial and antioxidant activity of leaf extracts of medicinal plants. World J Pharm Pharm Sci. 2015; 4: 1403-13.

Shankar S, Sathiavelu M. Antibacterial activity of *Dracaena lisa*. Bangladesh J Pharmacol. 2021; 16: 84-86.