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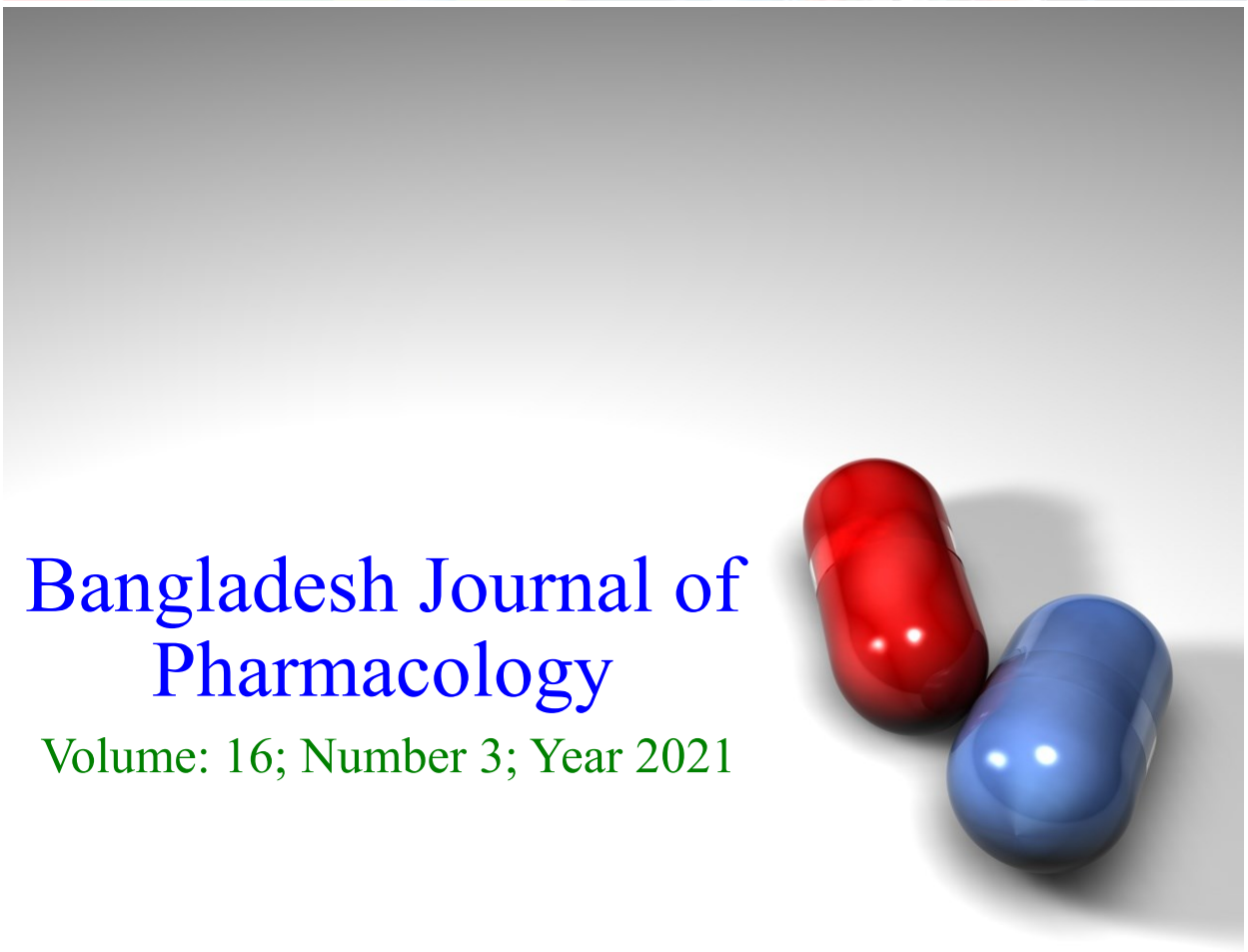

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Letter to the Editor

Antibacterial activity of *Alternanthera versicolor*

Sir,

Amaranthaceae is a cosmopolitan family with 64 genera and over 800 species. The Chinese crude medicine "Han -lian-cao" is extracted from the whole plant or aerial portion of *Alternanthera sessilis* and *Eclipta prostrate* in Taiwan (Hundiwale et al., 2012). *A. bettzickiana* is a prostrate perennial herb with decorative and food values (Pamila and Karpagam, 2018).

The presence of amino acids, alkaloids, carbohydrates, flavonoids, glycosides, saponins, sterols, triterpenoids, tannins, phenolics and protein in *A. brasiliana* leaves were reported in water and ethanol extracts. Plant alkaloids are the most effective bioactive chemicals. Antioxidant properties are proven to exist in flavonoids and phenols. Antioxidant property and their impact on the defence system against oxidative damage are mainly due to the existence of hydroxyl groups in their structures (Kasthuri et al., 2018). In certain places, *A. philoxeroides* is useful against bacterial incursions because it contains several bioactive substances such as oleanolic acid, phaeophytin a and phytol. Alternanthin B and N-trans-feruloyl-3, 5-dimethoxytyramine are the antitumor compound from *A. philoxeroides* (Akbar et al., 2021). Antihistaminic, antihepatotoxic, antiviral (HSV-1 and HIV), antileukemic, anticarcinogenic and diuretic activities are the pharmacological properties reported to be present in *A. tenella, A. sessilis, A. philoxeroides*, *A. brasiliana* and *A. pungens* (Petrus et al., 2014).

The study plants were collected from the Vellore Institute of Technology, Vellore District, Tamil Nadu. The fresh and healthy plants were carefully cleaned 3-4 times with running tap water and sterile water. Then the leaves were shade dried for 10 days at room temperature before being powdered with an electric blender.

About 10 g of dried leaves powder were soaked in 100 mL of methanol, dichloromethane and ethyl acetate (solvents with different polarity) and kept overnight in a rotating shaker at 120 rpm. Using Whatman filter paper No. 1, the extracts were filtered and the filtrates were kept in an airtight container for further studies.

The preliminary phytochemical analysis was done for the different extracts of the study plant using the standard protocol (Sundar et al., 2017). Antibacterial activity of plant crude extracts was performed through the agar well diffusion method (Passari et al., 2015). *Bacillus subtilis*, *Listeria monocytogenes* and *Staphylococcus aureus (*Gram positive) and *Escherichia coli* and *Klebsiella pneumonia* (Gram negative) were used as the test pathogen for this study. The agar plates were prepared and seeded with bacterial strains. Using sterile cork borer, wells were made on the agar plate and loaded with 100 µL of plant extracts of different concentrations (25, 50, 100 µg/mL). The plates were incubated overnight at 37°C, and the zone of inhibition was evaluated after the incubation time. Ciprofloxacin is used as positive control (standard). This is the first study to investigate the presence of phytochemicals and antibacterial activity of *A. versicolor*.

The presence of phenol, tannins and saponin in *A. versicolor* leaf extracts was determined by phytochemical screening. Flavonoids are not present. This research plant possesses bioactive components that are beneficial for its antibacterial property, as per the results of the agar well diffusion experiment (Figure 1).

All the screened plant crude extracts have antibacterial potent against *L. monocytogenes* and *S. aureus* (Table I). The greatest inhibition zone was recorded with 32 mm inhibition on *S. aureus* for methanol extract. Ethyl acetate extract exhibits a significant antimicrobial effect towards Gram positive strains *B. subtilis*, *L. monocytogenes*, *S. aureus*. Dichloromethane extract showed lesser antibacterial activity in comparison to other three extracts. The antibacterial activity of *A. versicolor* has never been reported before.

A study recorded an efficient antibacterial activity of *A. bettzickiana* against different pathogenic microorganisms (Pamila and Karpagam, 2017; Vidhya et al., 2015). *B. pumilus, B. subtilis* and *Salmonella typhi* are susceptible to aqueous extracts of *A. sessilis* and *A. philoxeroides.* The chloroform : methanolic (1:1) and aqueous extracts of *A. philoxeroides* were reported to possess antibacterial activity towards *Pseudomonas aeruginosa* (Akbar et al., 2021). In the liver of ovariectomized mice, *A. bettzickiana* enhanced superoxide dismutase and catalase activity.

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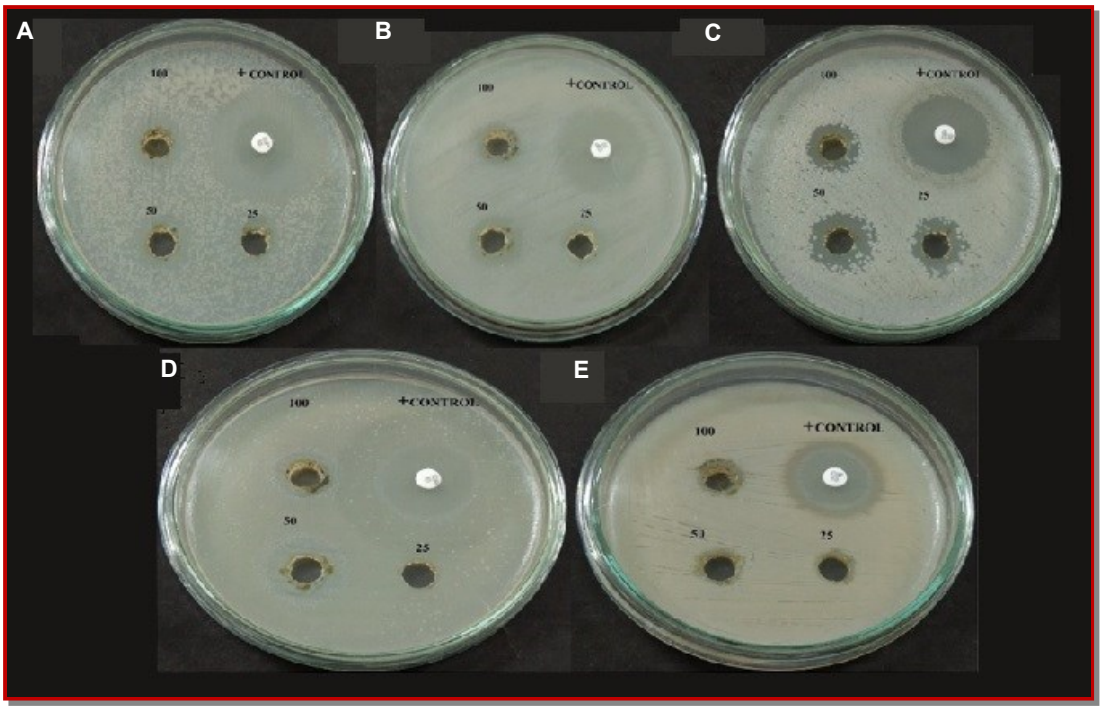

Figure 1: Antibacterial activity of ethyl acetate extract of *A. versicolor* leaves. *Bacillus subtilis* (A), *Listeria monocytogenes* (B), *Staphylococcus aureus* (C), *Escherichia coli* (D), *Klebsiella pneumoniae* (E)

Table I

Antibacterial properties of *A. versicolor* leaf extracts using agar well diffusion method

Extract	Concentration (µg/mL)	Zone of inhibition (mm)				
		Bacillus subtilis	*Listeria monocytogenes*	*Staphylococcus aureus*	*Escherichia coli*	*Klebsiella pneumoniae*
Methanol	25	11	10	25	-	-
	50	13	18	28	-	
	100	17	21	32	16	
Ethyl acetate	25	14	14	14	-	-
	50	16	14	15	14	11
	100	17	16	18	16	12
Dichloromethane	25	-	12	10	-	-
	50		18	12	11	
	100		25	15	15	
Standard (ciprofloxacin in mg)	10	36	30	40	40	27

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