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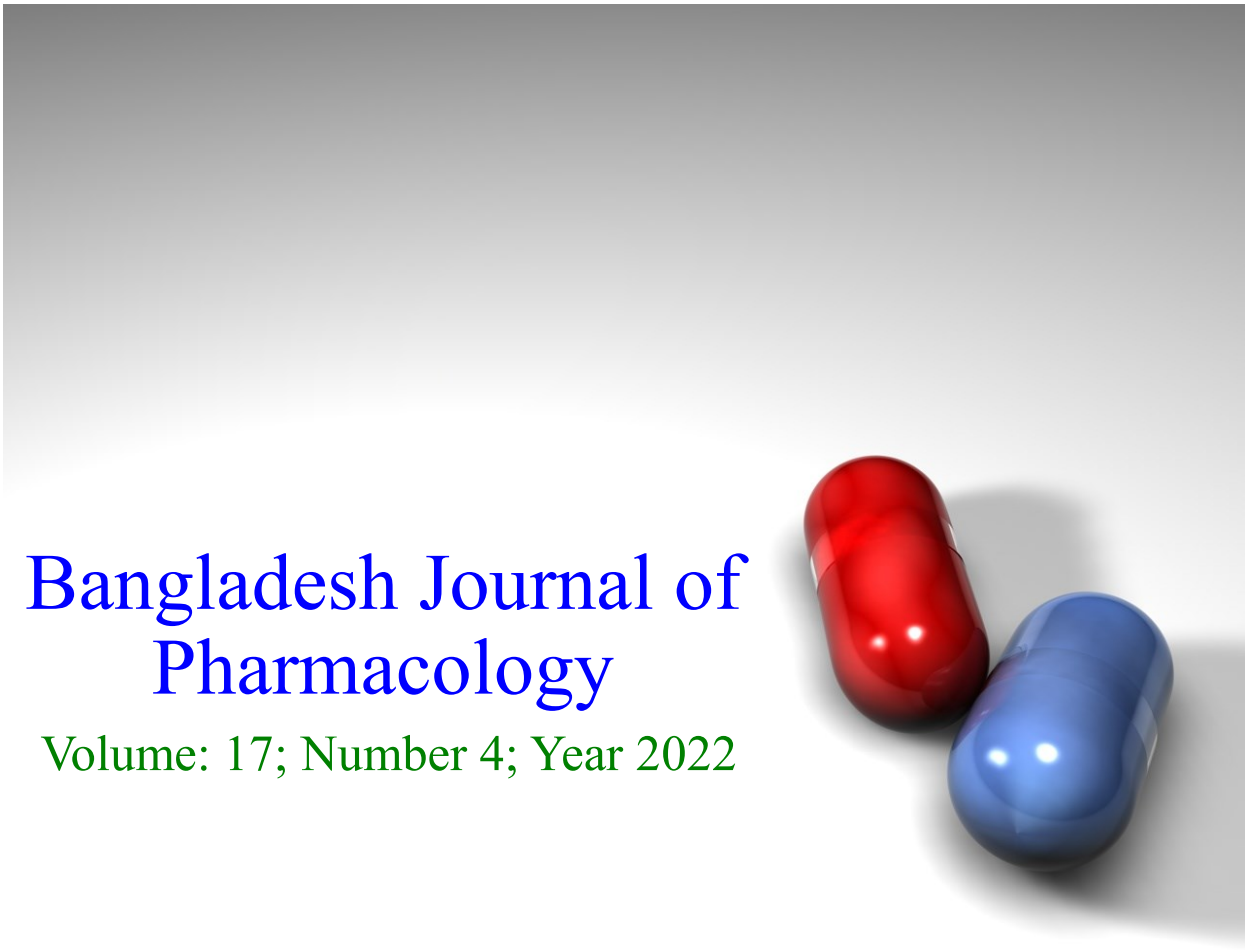

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Letter to the Editor

Tradescantia pallida, a natural alternative against vancomycin-resistant *Enterococci*

Sir,

Vancomycin-resistant *Enterococcus* infection is one of the multidrug-resistant bacteria caused by *Enterococcus faecium* and *E. faecalis*. Compared to MRSA, vancomycin -resistant *Enterococcus* has a lower prevalence and epidemiological impact.

Quinupristin and linezolid are two antibiotics often used to treat vancomycin-resistant *Enterococcus*. Multi-drug-resistant bacteria pose a significant public health risk, as the infections induced by them are difficult to treat and expensive (Sundar and Arunachalam, 2019).

The use of medicinal plants may involve an important role in the treatment of drug-resistant microorganisms. For example, hypericin from *Hypericum perforatum*, is effective against methicillin-resistant and methicillin-sensitive *Staphylococcus* (Bahmani et al., 2019). *Cathormion umbellatum* extract is effective against antibiotic-resistant *E. faecalis* (Rattanasuk et al., 2021).

Tradescantia pallida (Rose) D. R. Hunt., was well known as purple heart or wandering jew plant. They are commonly grown as ornamental plants and are widely distributed in tropical and subtropical regions. Traditionally, *T. pallida* have been used to improve blood circulation and as an anti-inflammatory and anti-toxic supplement (Tan et al., 2014). It is also reported to have antibacterial activity against Gram-positive and -negative bacteria (Kamiya et al., 2019). Previous literature reported that chloroform leaf extract from *T. pallida* purpurea has shown the most promising against the *Labeo rohita* fish pathogens. The natural colorants derived from *T. pallida*, anthocyanin and annatto, have also been linked to a wide range of health benefits (Bokhari et al., 2020). Therefore, the present research aimed to investigate the antibacterial efficacy of *T. pallida* stem and root crude extracts against human pathogens.

Healthy, mature and disease-free plant samples (stem and root) were collected from the Vellore district in a sterile polythene bag. The different samples for the antibacterial study were washed, air-dried and using an electric blender it is ground into a fine powder. About 10 to 15 g of powder was soaked in 200 mL of different polarity solvents such as dichloromethane, ethyl acetate and butanol. The flasks were incubated at room temperature in a rotatory shaker for 2 days at 120 rpm. Using Whatman filter paper No. 1, the resultant was filtered and dried. The extracted powder was dissolved in DMSO to a final concentration of 100 mg/mL for further studies (Bibi et al., 2011).

The antibacterial activity of the crude extracts was checked by the disc diffusion method against vancomycin-resistant *Enterococci* (ATCC 51299) and *Enterococcus faecalis*. The culture was freshly prepared in Brain heart infusion broth and standardized (5×10^7 CFU). The cultures were spread uniformly over the Muller Hinton agar medium. About 100 µL of different concentrations (25, 50, 75, 100 mg/mL) of extracts were introduced into the sterile disc placed over the medium to study their antibacterial property. The inhibition zone diameter was measured after overnight incubation at 37°C. Vancomycin and DMSO have used a positive and negative control respectively (Bibi et al., 2011).

The minimum inhibitory concentration of the extracts was checked by micro-broth dilution method using a 96 -well plate. The prepared extracts were diluted serially (two-fold) in Muller Hinton broth making a concentration of 50, 25, 12.5, 6.25, 3.12, 1.56 and 0.78 mg/mL. About 5 µL of inoculum was added and incubated for 18 hours at 37°C. The lowest concentration of the extract with no visible bacterial growth turbidity was recorded as MIC (Praptiwi et al., 2018).

From the study, it was noticed that stem crude extracts displayed a strong antibacterial activity compared to that root extracts. However, ethyl acetate extract from both parts of the plant had an antagonistic effect against test pathogens higher than the positive control vancomycin (Figure 1). The maximum inhibition zone diameter of 19 mm was observed in ethyl acetate extract obtained from the stem at 100 mg/mL concentration with a MIC of 6.25 mg/mL, followed by the root (13 mm) with MIC 12.5 mg/mL. The dichloromethane extracts were effective against the test pathogens at a concentration higher than 50 mg/mL. The stem dichloromethane extract exhibited an inhibition zone of 12 mm against vancomycin-resistant *Enterococci* and 18 mm against *E. faecalis* at 100 mg/mL. The butanol extracts were not active against vancomycin-resistant *Enterococci* whereas it was active against *E. faecalis* with a zone of inhibition of 15 and 12 mm of stem and root respectively. There was no zone of inhibition was

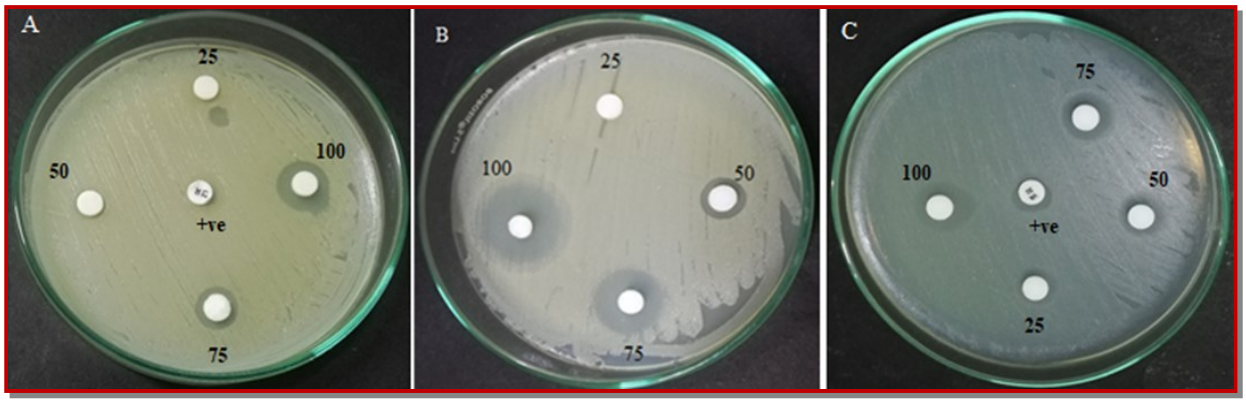

Figure 1: Antagonistic activity against vancomycin-resistant *Enterococcus* by dichloromethane (A), ethyl acetate extract of stem (B), and ethyl acetate extract of root (C)

Table I

Antibacterial efficacy of plant extracts (mg/mL)

Extracts	Inhibition zone (mm)						
	Vancomycin-resistant *Enterococcus*			E. *faecalis*			Vancomycin (positive control)
	50	75	100	50	75	100	(30 mg/disc)
Stem							6
Dichloromethane	-	10	12	12	15	18	
Ethyl acetate	11	14	19	13.5	16	18	
Butanol	-	-	-	-	11	15	
Root							
Dichloromethane	-	6	8.5	6	9	12	
Ethyl acetate	10	12	13	15	19	22	
Butanol	-	-	-	-	-	12	

Table II

MIC of plant crude extracts (mg/mL)

Organisms	Stem		Root	
	Dichloromethane	Ethyl acetate	Dichloromethane	Ethyl acetate
Vancomycin-resistant *Enterococcus*	25	6.25	50	12.5
E. *faecalis*	3.12	3.12	25	1.56
Vancomycin	50			

observed at 25 mg/mL concentration of all the extracts. Table I and II show the inhibition zone diameter and MIC of the potent crude extracts.

To the best of our knowledge, this is the first report on the anti-vancomycin-resistant *Enterococci* property of *T. pallida* crude extracts. The present study displayed that crude extracts obtained from the stem and root of *T. pallida* contain a wide range of phytoconstituents with potential antibacterial activity against the vancomycin-resistant *Enterococci* pathogen. Further isolation of bioactive compounds from the potent extract can serve as the source of natural products in the treatment of bacterial infections.

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