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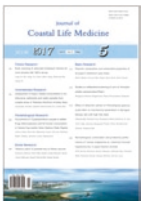

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Studies on antibacterial screening of corm of *Amorphophallus campanulatus* (Roxb.)

Bhagwan Mariba Waghmare*, Rahul Khushalrao Dhabale

Botany Research Centre, Department of Botany, Maharashtra Mahavidyalaya, Nilanga. Dist. Latur (M.S.), India

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ABSTRACT

Objective: To study the antibacterial screening of corm of *Amorphophallus campanulatus* (Roxb.) (*A. campanulatus*).
Methods: Antibacterial activities of methanolic, petroleum ether and ethyl acetate extracts of corm of *A. campanulatus* were studied by agar diffusion technique to determine *in vitro* antibacterial activities. The antibacterial activity was measured with respect to the standard antibacterial drug. In addition, minimum inhibitory concentration was also determined by using serial dilution method to determine and evaluate antibacterial potency of test corm extracts of *A. campanulatus.*
Results: The results showed significant antibacterial activities against four pathogenic bacteria. The minimum inhibitory concentration values against test bacteria were found to be remarkable range in bacteria like methicillin-resistant *Staphylococcus aureus* at concentration 0.25 mg/well, in *Pseudomonas aeruginosa* at 0.5 mg/well concentration, in *Vibrio cholerae* was 2 mg/well, *Streptococcus pyogenes* at concentration of 0.5 mg/well and *Proteus mirabilis* was at concentration of 2 mg/well.
Conclusions: The methanolic and petroleum ether extracts are capable to maximum inhibition of the tested pathogenic bacteria.

1. Introduction

The pathogenic infection caused by bacteria has been increased worldwide in immunocompromised patients in developing countries[1]. Today huge number of antibacterial agents have been discovered. The pathogenic microorganisms are adopted to develop resistence against antibacterial agent and caused in major of such resistence in countries like Bangladesh, Nepal, Nigeria and India.

Recently attempts have been made to investigate and determine the indegeneous drugs against infectious diseases[2,3]. The research in the field of indigeneous plants in a significant aspect of developing a safer antimicrobial principle was carried out through isolation, characterization, identification and biological studies[2].

The *Amorphophallus campanulatus* (Roxb.) (*A. campanulatus*) is a perennial herb belonged to family Araceae which have rounded tuberous roots known as corm. The *A. campanulatus* is widely distributed in India, Bangladesh and Africa[4-6] and Kinwat forest of Maharashtra[2].

The corm of *A. campanulatus* used as ethnomedicine and possessed antibacterial potential has not been completely carried out[7-9]. Therefore, the present investigation was designed and determined to study antibacterial activity of the corm of *A. campanulatus* by using different solvent system. The results are highly beneficial to antibacterial one[1].

2. Materials and methods

The corm of *A. campanulatus* was collected and identified in the month of September from the study area. The corms of *A. campanulatus* were thoroughly washed and shade dried. The voucher specimens of the plants parts have been deposited in the herbarium of Botany Research Centre, Department of Botany, Maharashtra Mahavidyalaya, Nilanga, Dist. Latur, as per literature[5,10-14].

2.1. Collection of microorganisms (bacterial strain)

The human pathogenic bacteria were utilized for further studies. The bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), *Streptococcus pyogenes* (*S. pyogenes*), *Pseudomonas aerugionsa* (*P. aerugionsa*), *Vibrio cholera* (*V. cholera*) and *Proteus*

*Corresponding author: Bhagwan Mariba Waghmare, Botany Research Centre, Department of Botany, Maharashtra Mahavidyalaya, Nilanga. Dist. Latur (M.S.), India.
Tel: 09423076915
E-mails: bmw146@gmail.com, biorahul4@gmail.com
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mirabilis (*P. mirabilis*) were collected from Home Department.

2.2. Procedure for antimicrobial activity

The agar diffusion method was used to evaluate the antibacterial activity. Bacteria were cultured overnight at 37 ˚C in Mueller-Hinton broth (MHB) and fungus at 28 ˚C for 72 h in potato dextrose broth (PDB) and used as inoculum. A final inoculum was derived by using 100 µL of suspension containing 10^4 CFU/mL of bacteria and 10^4 spore/mL of fungus which were spread on Mueller-Hinton Agar (MHA) and potato dextrose agar (PDA) medium, respectively.

Wells of 6 mm diameter were prepared in the solid agar. Gentamycin (25, 50, 100, 400, 800 µg/well) was used as positive controls for bacteria and amphotericin (25, 50, 100, 400, 800 µg/well) for fungi. The test samples (0.0625, 0.125, 0.25, 0.5, 1.0, 2.0 mg/well each) were applied and plates were incubated at 37 ˚C for 24 h for bacteria depending on the incubation time required for a visible growth. The antibacterial activity has been expressed as diameter (in mm) of inhibition zone which has been measured using standard scale. Triplicates set of readings were taken for each test and standard substance.

3. Results

The results were recorded in the form of data summerised in Tables 1–5. The results revealed that the antibacterial activities

Table 1
Antibacterial activity and MIC values (mg/well) of corm extracts of *A. campanulatus* against MRSA.

Sl. No.	Compounds name	Concentration of compounds						
		0.0625 mg	0.125 mg	0.25 mg	0.5 mg	1 mg	2 mg	MICmg
1	Methanol extract of *A. campanulatus*	0	0	0	0.2	0.4	1.4	0.5
2	Petroleum ether extract of *A. campanulatus*	0	0	0.1	0.2	0.3	0.7	0.25
3	Ethyl acetate extract of *A. campanulatus*	0	0	0	0	0	0	0
4	Standard drug (gentamycin)	25 µg	50 µg	100 µg	200 µg	400 µg	800 µg	MIC µg
5	Readings	1.3	1.8	2.1	2.5	2.7	3.4	< 25

Table 2
Antibacterial activity and MIC values (mg/well) of corm extracts of *A. campanulatus* against *P. aeruginosa.*

Sl. No.	Compounds name	Concentration of compounds						
		0.0625 mg	0.125 mg	0.25 mg	0.5 mg	1 mg	2 mg	MIC mg
1	Methanol extract of *A. campanulatus*	0	0	0	0.3	0.7	1.5	0.5
2	Petroleum ether extract of *A. campanulatus*	0	0	0	0	0.1	0.3	1
3	Ethyl acetate extract of *A. campanulatus*	0	0	0	0	0	0	0
4	Standard drug (gentamycin)	25 µg	50 µg	100 µg	200 µg	400 µg	800 µg	MIC µg
5	Readings	0	0	0.1	0.3	0.8	1.4	100

Table 3
Antibacterial activity and MIC values (mg/well) of corm extracts of *A. campanulatus* against *V. cholerae.*

Sl. No.	Compounds name	Concentration of compound						
		0.0625 mg	0.125 mg	0.25 mg	0.5 mg	1 mg	2 mg	MIC mg
1	Methanol extract of *A. campanulatus*	0	0	0	0	0.3	1.3	1
2	Petroleum ether extract of *A. campanulatus*	0	0	0.2	0.3	0.6	1.4	0.25
3	Ethyl acetate extract of *A. campanulatus*	0	0	0	0	0	0	0
4	Standard drug (gentamycin)	25 µg	50 µg	100 µg	200 µg	400 µg	800 µg	MIC µg
5	Readings	1.3	1.5	1.8	2.1	2.3	2.7	< 25

Table 4
Antibacterial activity and MIC values (mg/well) of corm extracts of *A. campanulatus* against *S. pyogene.*

Sl. No.	Compounds name	Concentration of compound						
		0.0625 mg	0.125 mg	0.25 mg	0.5 mg	1 mg	2 mg	MIC mg
1	Methanol extract of *A. campanulatus*	0	0	0	0	0	0.3	2
2	Petroleum ether extract of *A. campanulatus*	0	0	0	0.3	0.5	0.7	0.5
3	Ethyl acetate extract of *A. campanulatus*	0	0	0	0	0	0	0
4	Standard drug (gentamycin)	25 µg	50 µg	100 µg	200 µg	400 µg	800 µg	MIC µg
5	Readings	1.9	2.2	2.5	2.8	3	3.3	< 25

Table 5
Antibacterial activity and MIC values (mg/well) of corm extracts of *A. campanulatus* against *P. mirabilis.*

Sl. No.	Compounds name	Concentartion of compound						
		0.0625 mg	0.125 mg	0.25 mg	0.5 mg	1 mg	2 mg	MIC mg
1	Methanol extract of *A. campanulatus*	0	0	0	0.2	0.4	1.3	0.5
2	Petroleum ether extract of *A. campanulatus*	0	0	0	0	0.1	0.5	1
3	Ethyl acetate extract of *A. campanulatus*	0	0	0	0	0	0	0
4	Standard drug (gentamycin)	25 µg	50 µg	100 µg	200 µg	400 µg	800 µg	MIC µg
5	Readings	0.9	1.3	1.8	2.1	2.5	2.7	< 25

were recorded against MRSA, *P. aeruginosa*, *V. cholerae*, *S. pyogenes* and *P. mirabilis* by using methanolic, petroleum ether and ethyl acetate corm extracts of *A. camapnulatus*.

The maximum inhibition of MRSA, *P. mirabilis* and *P. aeruginosa* were found in methanolic corm extract of *A. campanulatus* than to petroleum ether extract. The minimum inhibitory concentration (MIC) concentration was determined by methanolic extracts at 0.5 mg/well and 0.25 mg/well in petroleum ether extract of *A. camapnulatus* (Figure 1).

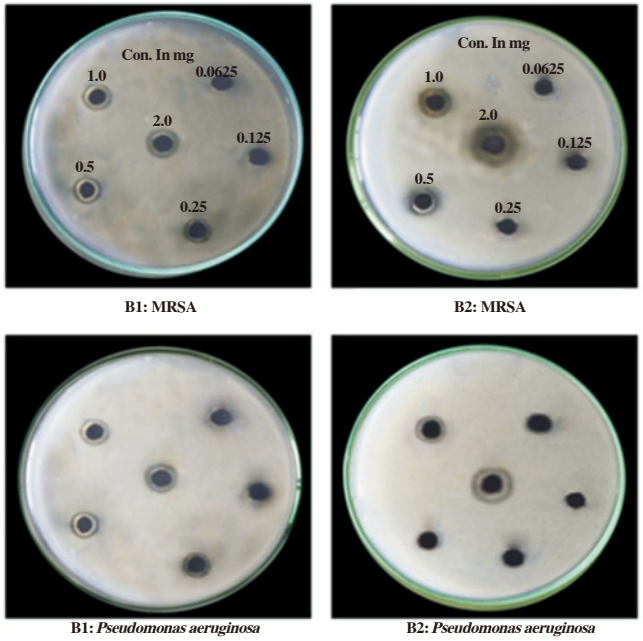

Figure 1. Antibacterial activity of corm of *A. campanulatus* (Roxb.). B1: Methanol extract; B2: Petroleum ether extract.

4. Discussion

The corm extracts of *A. campanulatus* were used against MRSA, *P. aeruginosa*, *V. cholerae*, *S. pyogene* and *P. mirabilis* and the results were given in the Table 1–5, respectively. As shown in results, maximum inhibition of MRSA, *P. mirabilis* and *P. aeruginosa* were observed in presence of methanol corm extracts of *A. campanulatus* followed by petroleum ether extracts at the concentration of 2 mg/well and extract of ethyl acetate was not found effective against the test bacteria, which is in line with Al-Bari *et al.*[15].

The MIC was recorded against *P. mirabilis* and *P. aeruginosa* in methanol corm extract of *A. campanulatus* acting at 0.5 mg/well. However, MRSA in presence of test extracts and minimum inhibition were found by means of petroleum ether corm extracts of *A. campanulatus* at concentration 0.25 mg/well, which is in accord with Nataraj *et al.*[14] and Shinde[9].

The inhibition of *V. cholerae* and *S. pyogenes* were observed maximum in presence of petroleum ether corm (PECE) extracts of *A. campanulatus*, then to methanol extract (MCE) at the concentration of 2 mg/well. Whereas, the MIC was calculated against *V. cholera* which was found in presence of petroleum ether corm extract of *A. campanulatus* at concentration 0.25 mg/well and in case of *S. pyogenes* at 0.5 mg/well.

Conflict of interest statement

We declare that we have no conflict of interest.

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