



Research article

Assessment of antibacterial activity of *Amorphophallus paeoniifolius* tuber and its peel extracts

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Abstract: The aim of the present study was to assess *Amorphophallus paeoniifolius* tuber and its peel for its antibacterial activity. The tuber and peel extracts of the selected plant were tested against five pathogenic bacteria. The ethanolic tuber extract of the plant shown inhibitory effect on four bacterial species such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Streptococcus mutans*. The ethanolic tuber extract displayed no effect on *Bacillus subtilis*. The ethanolic extract of tuber showed diameter of inhibition zones ranging from 6 mm-18 mm. The ethanolic extract of peel showed inhibitory effect only on two bacterial species such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The ethanolic extract of peel exhibited inhibition zone ranging from 7 mm to 16 mm. Water extracts of tuber (inhibition zone ranging from 7 mm to 9mm) and peel (inhibition zone ranging from 6 mm to 9 mm) inhibited only one bacterial species such as *Staphylococcus aureus* and *Streptococcus mutans* respectively.

Keywords: Suran - Tuber - Peel - Ethanolic extract - Pathogenic bacteria.

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INTRODUCTION

Medicinal plants gaining lot of importance now days because of their efficacy in healing different disorders traditionally (Kadali & Sandeep 2015). The best source of drugs without lethal effects to human systems could be the plant source and this has been proved by the traditional healing system and the recent studies conducted on the experimental animals (Kadali *et al.* 2015). Herbs are the source of magnificent inhibitors that could act on wide variety of diseases. One of the great aspect of herbs is they show 100% results when comes to the healing. Herbs have all sorts of answers against various diseases (Kadali *et al.* 2016).

Amorphophallus paeoniifolius (Dennst) Nicolson belongs to family Araceae known as Suran is a well-known plant in the Indian traditional system of medicine and distributed throughout India (Prمود *et al.* 2012). It is known to have Cytotoxic activity (Angayarkanni *et al.* 2007), CNS depressants activity (Das *et al.* 2009). It also possesses hepatoprotective effect against paracetamol-induced liver damage in rats (Prمود *et al.* 2012). Methanolic extract of *Amorphophallus paeoniifolius* tuber proved to be antihelmenthic (Dey & Ghosh. 2010). Methanolic extract of *Amorphophallus* has the gastro protective ability against pylorus ligation induced gastotoxicity in albino rats (Nataraj *et al.* 2011). Petroleum ether extracts of *Amorphophallus* showed dose-dependent activity regarding onset of convulsion (De *et al.* 2012). Ethanolic extract of *A. paeoniifolius* leaves exhibited a statistically significant reduction in the severity and frequency of diarrhoea produced by castor oil (Purwal *et al.* 2011). The ethanolic extract of *Amorphophallus paeoniifolius* has shown significant antitumor and antioxidant effect in animals and tuber stimulates both cellular and humoral immunity (Jagadheesh *et al.* 2010). In this study an attempt has been made to assess the anti-bacterial activity using ethanol and water extracts of tuber and peel of *Amorphophallus paeoniifolius* against five pathogenic bacteria.

MATERIALS AND METHODS

Collection of Plant material

Tubers of *Amorphophallus paeoniifolius* (Dennst) Nicolson were collected from village Seshammachruvu,

Achanta mandalam, West Godavari district. The tubers were authenticated by Dr. N. Suryanayana raju, Department of Botany, SVKP & Dr. K S Raju Arts and Science College, Penugonda. Tubers were cut in to small pieces and dried in sunlight for a week and then powdered using blender to get coarse powder.

Test Microorganisms

The Tuber and Peel extracts of *Amorphophallus paeoniifolius* were tested against five pathogenic bacteria. The test organisms include *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis* and *Streptococcus mutans*.

Extraction process

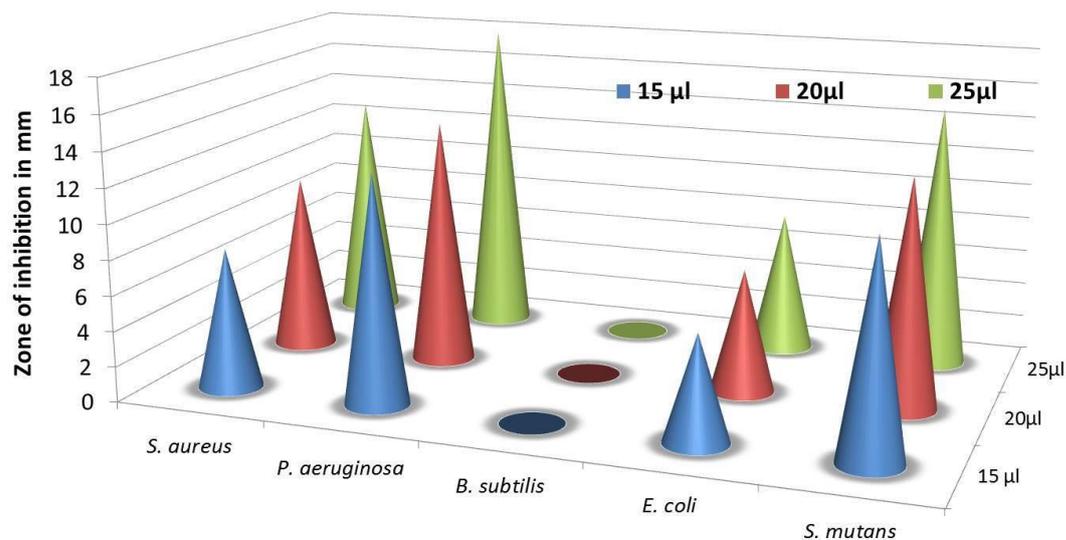
Preparation of extracts was done according to the procedure done by (Sharmila & Gomathi. 2011). 25g of tuber powder was packed in soxhlet extraction unit and exhaustively extracted using 100 ml of ethanol and water at 60°C for 12 hours. The extract was completely dried in water bath at 40°C and subsequent stored at 4°C. Peel extracts were also prepared by using above procedure.

Determination of antibacterial activity

Antibacterial activity was measured by well diffusion method (Perez *et al.* 1990). Nutrient agar (Hi media) was prepared and poured in to the petriplates. After solidification of media, overnight bacterial cultures were inoculated on the surface of media. By using a sterile gel puncher 4 mm of wells were made in each petri plates. Then 15 µl, 20 µl, 25 µl of ethanol, and water extracts of tuber and peel of *Amorphophallus paeoniifolius* were added in to the three wells respectively. The plates were incubated in the incubator at 37°C for optimum bacterial growth. In the next day, diameter of the zone of inhibition was measured.

RESULTS

The ethanolic tuber extract of *Amorphophallus paeoniifolius* (Dennst) Nicolson showed inhibitory effect on four bacterial species such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Streptococcus mutans*. The ethanolic tuber extract exhibited no effect on *Bacillus subtilis*. The inhibition zones for *S. aureus* were 8 mm, 10 mm & 13 mm; *P. aeruginosa* were 13 mm, 14 mm & 18 mm; *E. coli* were 6 mm, 7 mm & 8 mm and *S. mutans* were 12 mm, 13 mm & 15 mm (including well 4 mm) at concentrations of 15 µl, 20 µl and 25 µl respectively (Fig. 1). The ethanolic extract of peel displayed inhibitory effect only on two bacterial species such as *Staphylococcus aureus* and *Pseudomonas aeruginosa* with the inhibition zones 7 mm, 11 mm & 12 mm and 11 mm, 14 mm & 16 mm respectively at concentrations of 15 µl, 20 µl and 25 µl (Fig. 2). The water extract of tuber inhibited only one bacterial species *S. aureus* (7 mm, 8 mm & 9 mm). On the other hand the water extract of peel inhibited only *Streptococcus mutans* (6 mm, 7 mm & 9 mm) (Table 1).



	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>B. subtilis</i>	<i>E. coli</i>	<i>S. mutans</i>
■ 15 µl	8	13	0	6	12
■ 20 µl	10	14	0	7	13
■ 25 µl	13	18	0	8	15

Figure 1. Inhibition zones of ethanolic extract of *Amorphophallus paeoniifolius* tuber on different bacterial species.

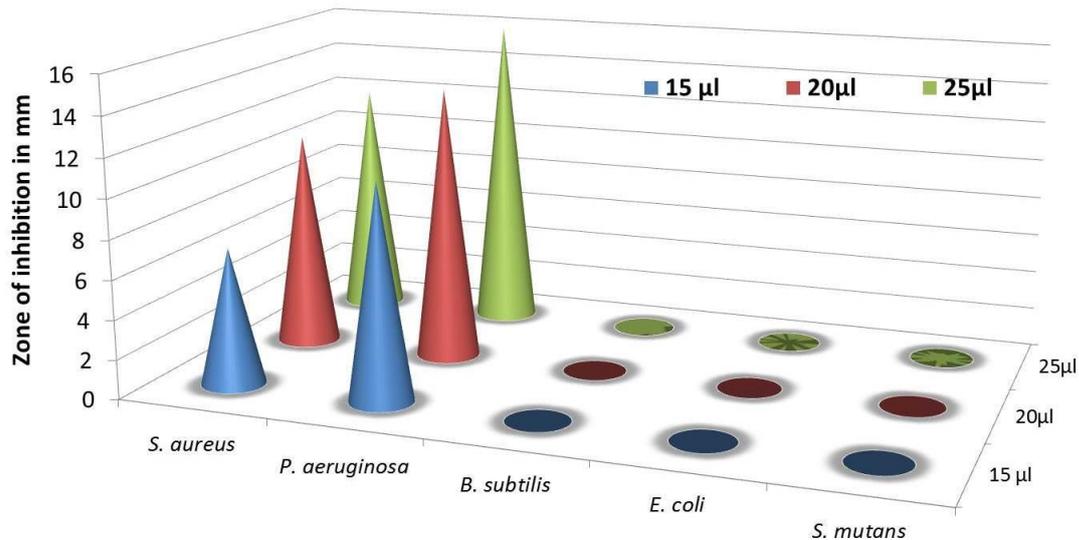


Figure 2. Inhibition zones of ethanolic extract of *Amorphophallus paeoniifolius* peel on different bacterial species.

	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>B. subtilis</i>	<i>E. coli</i>	<i>S. mutans</i>
15 µl	7	11	0	0	0
20 µl	11	14	0	0	0
25 µl	12	16	0	0	0

Table 1. Inhibition zones of water extract of *Amorphophallus paeoniifolius* tuber and peel against test pathogenic bacteria.

Test bacterial species	Inhibition zones in mm (including well 4mm)					
	15 µl/Tuber	20 µl/Tuber	25 µl/Tuber	15 µl/Peel	20 µl/Peel	25 µl/Peel
<i>Staphylococcus aureus</i>	7 mm	8 mm	9 mm	-	-	-
<i>Pseudomonas aeruginosa</i>	-	-	-	-	-	-
<i>Bacillus subtilis</i>	-	-	-	-	-	-
<i>Escherichia coli</i>	-	-	-	-	-	-
<i>Streptococcus mutans</i>	-	-	-	6 mm	7 mm	9 mm

Note: - indicates no zone of inhibition.

DISCUSSION

As the modern antibiotics have innumerable anarchic toxic effects, plant extracts could assist as alternative antibacterial agents. Researchers centring on the traditional healers in order to find plant based drugs (Kadali *et al.* 2015). This study showed that the *Amorphophallus paeoniifolius* exhibited significant antibacterial activity against five pathogenic bacteria. The ethanolic extract of tuber showed diameter inhibition zones ranging from 6–18 mm. The water extract of tuber showed ranging from 7 mm to 9 mm. The ethanolic extract of peel exhibited inhibition zone ranging from 7 mm to 16 mm. The water extract of tuber and peel exhibited inhibition zones ranging from 7 mm to 9mm and 6 mm to 9 mm respectively. The ethanolic extract has exhibited significant anti-bacterial activity than the water extract may be due to the release of bio active compounds which are responsible for the anti-bacterial activity in to the ethanol than water.

CONCLUSION

In this present study it can be concluded that the *Amorphophallus paeoniifolius* has anti-bacterial activity in its tuber and peel extracts. This tuber accounts for several pharmacological effects. Hence essentially, effective work should be done to isolate the compounds liable for its various medicinal activities.

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