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ANTIMICROBIAL ACTIVITY OF THE EXTRACTS OF *SALACIA OBLONGA* WALL.

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Abstract

Salacia oblonga Wall. belonging to the family celastraceae is used in the treatment of diabetes, rheumatism, gonorrhoea, itches, asthma, wound healing, amenorrhea and ear diseases. It is a woody climber distributed in Sri Lanka and Southern regions of India. In the present study antimicrobial activity of *Salacia oblonga* was evaluated against pathogenic strains, gram +ve *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Bacillus subtilis*, *Listeria monocytogenes* and gram -ve *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Escherichia coli, Salmonella typhimurium*. Ethyl acetate (EtOAc) aerial and root part extracts of *Salacia oblonga* have shown good activity towards all the pathogenic species. The zones of inhibition in the acidic EtOAc aerial and root extracts were measured to assess the antimicrobial activity.

Introduction

Plants are considered world's best chemists. Their unparalleled biosynthetic capacity has been exploited through their use in medical and commercial applications. Development of multiple drug resistance has necessitated the search for alternative sources of antimicrobials. Antimicrobial activity is due to the active substances synthesized during secondary metabolism of the plants (Kiranmayee Rao et al., 2010). *Salacia oblonga* (*S. oblonga*) Wall. belonging to the family *celastraceae* is a woody climber distributed in Sri Lanka and Southern regions of India. In India, the plants have been prescribed as an anodyne, anti-inflammatory agent and liver tonic and also for wound healing and treatment of amenorrhea. The roots and aerial parts of *S. oblonga* have been used extensively in traditional Indian Medicine for the treatment of Diabetes. According to the Indian pharmacopoeia, the root bark of *S.oblonga* is used in gonorrhoea, rheumatism and skin diseases (Chopra et al., 1956). Its aqueous extract showed significant hypoglycemic activity (Karunanayake et al., 1984). Root bark boiled in oil or as decoction or as powder is used for the treatment of rheumatism, gonorrhoea, itches, asthma, thirst and ear diseases (Anonymous, 1972).

Materials and Methods

Plant material

Salacia oblonga plants were collected from Western Ghats, Karnataka, India, and authenticated by Dr. N. Siddamallayya., Research Officer, Regional Research Institute (Ay.), Bangalore, India as *S. oblonga*.

Preparation of the extract

The plants were washed and air dried in a dark place for two weeks. The dried plant parts were separated as aerial (leaf and stem) and root parts. These separated parts were ground to fine powder using an electric blender. Ethyl acetate (EtOAc) was the choice of solvent for extraction of active principles from *S. oblonga* aerial and root parts. They were extracted at both acidic and neutral pH using a soxhlet apparatus and were concentrated in a rotavapour at 60°C and stored at 4°C.

Microorganisms

Human pathogens gram -ve and gram +ve microorganisms were used in the present study. Gram +ve *Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis, Bacillus subtilis, Listeria monocytogenes* and gram -ve *Klebsiella pneumoniae, Enterobacter aerogenes, Enterobacter cloacae, Pseudomonas aeruginosa, Escherichia coli, Salmonella typhimurium* cultures were obtained from Global Hospitals, Hyderabad, India, as clinical isolates. The bacterial cultures were maintained on Mueller Hinton Agar (Himedia, India) and stored at 4°C with a sub-culture period of 15 days. Before usage the cultures were Activated in Mueller Hinton broth and cultured at 37°C before the antimicrobial assay.

Antimicrobial assay

The antimicrobial activity was investigated by the agar well diffusion method (Perez et al., 1990). The Mueller-Hinton agar (MHA) was poured with an inoculum size of 10^6 colony forming units (c.f.u)/ml of bacteria onto the Petri plates, the wells were made in the MHA plates with the help of a borer (8mm).The extracts of 250 µg, 500 µg, 750 µg and 1000 µg concentrations were used

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for checking the activity. Amikacin a broad spectrum antibiotic at a concentration of 50 µg was used as a +ve control, the solvent in neutral & acidic range was used for testing antimicrobial activity, which served as -ve controls. The plates were incubated overnight at 37°C for bacterial growth. The zones of inhibition around the wells were measured after incubation. All the experiments were performed in triplicate and the results tabulated.

Results and discussion

Antimicrobial activity of *S. oblonga* wall. was evaluated by using solvent EtOAc with eleven different pathogenic species at acidic and neutral range. As depicted in Table 1 the aerial and root parts of *S.oblonga* have shown good activity towards all the pathogenic species with EtOAc extracts. The antimicrobial activity in EtOAc extracts is pronounced towards gram +ve & gram –ve bacteria. The activity of EtOAc extract in acidic pH was shown to be better than the neutral pH. The maximum antimicrobial activity in terms of zone of inhibition was observed with *Klebsiella pneumoniae* (*K. pneumoniae*). The zone of inhibition for EtOAc extract ranged from 9.33±0.58mm to 22.33±0.58mm for various pathogens. The highest zone was displayed against *K. pneumoniae* 22.33±0.58mm by EtOAc aerial extracts. Root extract in EtOAc also showed comparable diameter of inhibition zones (Fig 1). Similar kinds of studies have been reported for some other plant species towards human pathogens. Beevi et al. (2009) reported antimicrobial activity of *Raphanus sativus* methanolic extract against pathogenic bacteria. Kiranmayee et al. (2010) reported antibacterial activity of *Alpinia galanga* (L.) extracts against human pathogens.

Figure 1: Zones of inhibition of aerial & root EtOAc extract at acidic & neutral pH against *Klebsiella pneumoniae* (250 µg, 500 µg, 750 µg and 1000 µg concentration of extracts in 1, 2, 3 & 4 wells)

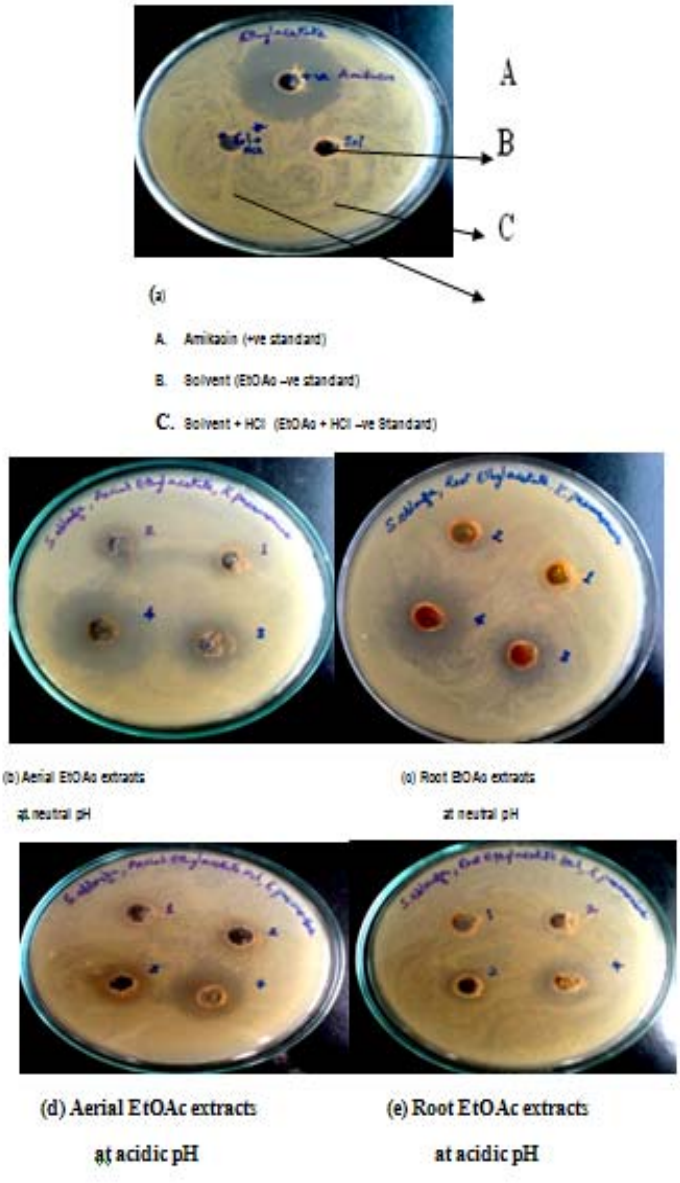

Table 1: Antimicrobial activity in ethyl acetate extract of *Salacia oblonga*

Microorganism	Concentration (µg)	Ethyl acetate zone of inhibition(mm) Aerial neutral	Aerial acidic	Root neutral	Root acidic	Antibiotic(Amikacin) (50 µg)
Klebsiella pneumoniae	250	9.67±0.58	9.67±0.58	9.67±0.58	10.33±0.58	26.33±0.58
	500	11.33±0.58	10.33±0.58	10.33±0.58	12.67±0.29	
	750	13.33±0.58	13.33±0.58	14.33±0.58	16.33±0.58	
	1000	20.33±0.58	22.33±0.58	21.33±0.58	21.33±0.58	
Staphylococcus aureus	250	9.67±0.58	10.33±0.58	9.50±0.87	10.33±0.58	28.66±0.47
	500	10.33±0.58	10.67±0.58	9.67±0.58	11.33±0.58	
	750	12.33±0.58	12.33±0.58	11.33±0.58	12.33±0.58	
	1000	12.67±0.58	13.33±0.58	11.67±0.58	14.67±0.58	
Staphylococcus epidermidis	250	9.67±0.58	10.33±0.58	9.67±0.58	10.33±0.58	26.33±0.58
	500	10.83±0.29	10.83±0.29	10.67±0.58	11.67±0.58	
	750	12.33±0.58	12.67±0.76	11.67±0.58	12.83±0.29	
	1000	11.67±0.58	12.83±0.58	13.67±0.58	14.33±0.58	
Escherichia coli	250	9.67±0.58	9.67±0.58	9.67±0.58	9.67±0.58	31.16±0.58
	500	9.67±0.58	11.33±0.58	9.67±0.58	12.33±0.58	
	750	10.67±0.58	12.67±0.58	10.67±0.58	13.33±0.58	
	1000	11.33±0.58	13.33±0.58	12.67±0.58	13.33±0.58	
Enterococcus faecalis	250	9.67±0.58	9.33±0.76	9.33±0.58	10.67±0.58	31.66±0.58
	500	10.67±0.76	9.33±0.76	9.33±0.58	11.67±0.58	
	750	11.67±0.76	9.67±0.58	9.33±0.58	12.67±0.58	
	1000	12.67±0.29	10.33±0.58	9.67±0.58	13.67±0.58	
Bacillus subtilis	250	9.67±0.58	9.33±0.58	9.33±0.58	9.67±0.58	33.90±0.79
	500	10.33±0.58	10.67±0.58	10.67±0.58	10.67±0.58	
	750	11.67±0.58	10.67±0.58	10.67±0.58	12.33±0.58	
	1000	12.67±0.58	11.33±0.58	11.33±0.58	13.33±0.58	
Pseudomonas aeruginosa	250	9.67±0.58	10.33±0.58	9.67±0.58	10.50±0.87	24.33±0.76
	500	9.67±0.58	11.33±0.58	10.67±0.58	12.33±0.58	
	750	12.67±0.58	13.33±0.58	12.33±0.58	13.33±0.58	
	1000	14.33±0.58	14.33±0.58	14.33±0.58	15.33±0.58	
Listeria monocytogenes	250	9.33±0.58	9.67±0.58	--	--	27.50±0.50
	500	9.67±0.58	10.33±0.58	--	--	
	750	9.83±0.76	12.33±0.58	--	--	
	1000	11.67±0.29	13.33±0.58	--	--	
Salmonella typhimurium	250	9.33±0.58	9.33±0.58	9.33±0.58	9.83±0.76	27.16±0.76
	500	10.33±0.58	10.67±0.58	9.83±0.76	11.67±0.58	
	750	10.33±0.58	12.33±0.58	10.33±0.58	12.33±0.58	
	1000	11.33±0.58	13.33±0.58	11.33±0.58	13.33±0.58	
Enterobactor aerogenes	250	9.67±0.58	9.33±0.58	10.33±0.58	11.33±0.58	29.66±0.58
	500	11.33±0.58	12.33±0.58	12.33±0.58	14.67±0.58	
	750	13.33±0.58	13.67±0.29	13.67±0.58	16.33±0.58	
	1000	14.33±0.58	14.67±0.76	14.33±0.58	17.33±0.58	
Enterobactor cloacae	250	9.67±0.58	9.67±0.58	9.33±0.58	10.33±0.58	28.50±0.86
	500	9.67±0.58	10.33±0.58	10.67±0.58	11.33±0.58	
	750	11.33±0.58	11.33±0.58	10.67±0.58	11.67±0.58	
	1000	11.33±0.58	11.33±0.58	11.67±0.58	11.67±1.53	

Conclusion

S.oblonga distributed in Southern regions of India and Sri Lanka is a woody climber, it has been used for the treatment of gonorrhoea, rheumatism, skin diseases and diabetes. Its extract has been analyzed for its hypoglycemic and antineoplastic activities. *S.oblonga* EtOAc acidic & neutral extracts have been active against eleven gram +ve & gram –ve microbial pathogens. This activity shows that the extracts have a broad range. EtOAc was the best solvent according to the *in vitro* results.

References

Anonymous, (1972) *Wealth of India.* Council of Scientific and Industrial Research, New Delhi, Vol. IX, p. 168.

Beevi, S.S., Mangamoori, L. N., & Anabrolu, N. (2009). *World J. Microbiol. Biotechnol.* 25, 465-473. doi: 10.1007/s11274-008-9911-3.

Chopra, R.N., Nayar, S.L and Chopra, 1.C, (1956) *Glossary lndian Medicinal Plants.* Council of Scientific and Industrial Research, New Delhi, pp. 32, 218.

Karunanayake, E.H., Welihinda, J., Sirimanne, S.R. and Gowri Sinnadorai, P. (1984) Oral hypoglycemic activity of some medicinal plants of Sri Lanka. *J. Ethnopharmacol*. 11,223-231.

Kiranmayee Rao., Bhuvaneswari, Mangamoori, L. N. & Giri, A., (2010) *Appl Biochem Biotechnol*, 162, 871-884. doi: 10.1007/s12010-009-8900-9.

Perez C, Pauli M, Bazerque P. Acta Biol. Med. Exp.1990;15:11.