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Screening of Antibacterial Activities of *Salacia Macrosparma* (Wight) Extracts

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ABSTRACT

The aim of the present study was to evaluate the antibacterial activities of root and leaf extracts in relation to petroleum ether and acetone extracts of the plant S. macrosperma. The activities were tested on five gram negative bacterium with agar well diffusion method. The extracts exhibited antibacterial activities to a certain degree. The lowest zone of inhibition observed in P. volgaris (6 mm) from acetone extract followed petroleum ether (8 mm) from root extract and the high zone of any inhibition (15 mm) was observed from acetone extracts in S. typhimurium and P. aeronosea as (14 mm) and it also revealed dose dependence zone of inhibition from both the solvent of root and leaf of S. macrosparma. The antibacterial potential activities are the better source for further herbal medicine.

Keywords: Antibacterial activity, Root and leaf extract, *Salacia macrosperma* (Wight)

INTRODUCTION

The genus, *Salacia* belongs to the family Hippocrateaceae, class Magnoliopsida and order-Celastrales, having 407 different species. These species are widely distributed in South-West India, Peninsular region of India, Sri Lanka, Vietnam, China, Indonesia, Brazil, South Africa, Malaysia, Thailand and Philippines [1,2]. *S. oblonga* (Wall), *S. reticulate* (Wight), *S. chinensisis* (Linn), *S. macrosperma* (Wight) growing in its natural habitat. In India, it is well distributed in Karnataka including Western Ghats, from Konkan southwards [3], Kerala (coastal forests of Kollam and Idukki districts) and Southern parts of Odisha [4]. Different species of *Salacia* have medicinal principles with a high pharmacological significance. In traditional medicine different species of the genus, *Salacia* are being used as acrid, bitter, thermogenic, urinary and as liver tonic. The roots of *Salacia* are extensively used in traditional Indian medicine and Unani for treating diabetes, gonorrhea, rheumatism, itching, asthma, ear diseases, leukemia and inflammations [5-7]. The decoction of *S. reticulata* roots is used in the treatment of itching and swelling, asthma, thirst, amenorrhea and dysmenorrhea [8]. The roots are acrid, bitter, thermogenic, urinary, astringent, anodyne, and anti-inflammatory [9]. The roots and stem of *S. reticulata* have been widely used in treating diabetes and obesity [10-12], gonorrhea and rheumatism [10], skin diseases [4] and hemorrhoids [9]. In addition, the water extracts of leaves of *S. reticulata* is beneficial for the prevention of diabetes and obesity [13,14]. In addition to the above, *S. reticulata* has been widely in traditional medicine for treating or preventing several other disorders. The *S. macrosperma* published documentary evidences are on such usages is lacking. Hence the current work has been undertaken to evaluate the antibacterial abilities of the *S. macrosperma* plant extracts.

MATERIALS AND METHODS

Collection of materials

The plant materials were collected from Trimbakeshwar, Nashik District Maharashtra (Located of $73^0$53'76"N to $19^0$91'76"E latitude). A medicinal plant was collected and was used for the purpose of their phytochemical analysis. The plants collected were identified. Fresh and tender leaves and root of selected plants species were used for extraction.

Chemicals

All chemicals and reagents used in this study were of analytical grade and obtained from Merck Company, Germany.

Preparation of extracts

The plant leaf and root material was dried under shade at room temperature for about 10 days. The dried plant samples were powdered by mechanical grinder and sieved to give particle size 50 to 150 mm. The powder was stored in polythene bags at room temperature before extraction. Powder (25 g) was filled in the thimble and extracted successively with 70% methanol (methanol: water; 70:30) and ethyl acetate: chloroform: ethyl alcohol (40:30:30) solvents in soxhlet extractor for 48 hours. The extracts were concentrated to dryness using rotary evaporator and crude extracts were tested.

Antibacterial test

The antibacterial activity was carried on bacterium such as *Escherichia coli, Pseudomonas aeruginosa, Proteus volgaris, Salmonella typhimurium* and *Shigella flexneri*. It was carried on aqueous extracts and well diffusion method for solvent extracts. The molten Muller Agar (HiMedia) was inoculated with the 100 µl of inoculum (1 × 106 CFU) and poured in to sterilized petri plate. For agar disc diffusion method, the disc (0.7 cm) was saturated with 1000 µl of test compound, allowed to dry and was introduced on the upper layer of the seeded agar plate. The plates were incubated over night at 37°C. Microbial growth was determined by measuring diameter of the zone of inhibition. For each bacterial strain control was maintained in pure solvent were used instead of extract. The result was obtained by measuring the zone of inhibitions in a diameter. The experiment was repeated three time and mean values were used. The obtained data were compared with the standard antibiotics penicillium (100 µl/disc) and gentamicin (10 µl/disc).

RESULTS AND DISCUSSION

Antibacterial effects of leaf and root extracts of plant in petroleum ether and acetone used in the study are given in **Table 1**. The petroleum ether and acetone extracts of leaf and root of the plant species S. *macrosparma* were tested against three gram-negative bacterium using agar well diffusion method. The plant exhibited antibacterial activities to a certain degree. It was observed that these extracts inhibited developments of bacteria at different rates. According to this, it was detected that it had very low levels of effect against microorganisms such as *P. volgaris* (6 mm/inhibition zone) from acetone extract followed petroleum ether (8 mm/inhibition zone) from root extract. The high zone of any inhibition (15 mm) was observed from acetone extracts in *S. typhimurium* and *P. aeronosea* as 14 mm zone of inhibition.

Sr. No	Bacterial strains	Solvent Extract	Root Extract		Leaf Extract	
			10 µl	20 µl	10 µl	20 µl
1	*Escherichia coli*	Petroleum ether	9	9	8	9
		Acetone	8	9	9	15
2	*Salmonella typhimurium*	Petroleum ether	12	11	8	9
		Acetone	13	15	6	10
3	*Proteus volgaris*	Petroleum ether	8	10	8	15
		Acetone	6	9	9	9
4	*Pseudomonas aeruginosa*	Petroleum ether	10	11	8	6
		Acetone	11	14	9	10
5	*Shigella flexneri*	Petroleum ether	9	9	8	11
		Acetone	9	8	8	10

Table 1: Antibacterial activity of *S. macrosperma* extracts.

Antimicrobial activity of *S. oblonga*, *S. chinensis*, *S. macrosperma* and *S. beddomei* was studied against bacteria and fungi [12,15]. Leaves and stem extracts of petroleum ether, ethyl acetate and chloroform acetate were tested and found to be most effective ethyl acetate against tested bacteria several pathogenic bacteria and fungi [12].

The antibacterial activity varies species to species because of the antibacterial substances present in plant. There is need to successful evaluation of plant substances and the type of solvent used in the extraction procedures [16]. Researcher mostly preferred water extract, but extracts in organic solvent (methanol) provided more consistent antibacterial activity compared to water. Several workers have identified plant compounds that are known to be antibacterial [17]. Traditional herbal remedies used in world are important sources for discovery of new antibiotics [18]. The antibiotic property of plant compounds that indicates the need for further search in to traditional system but need to reduce possible toxicity present in plant compound. Ethanol extract of *S. macrosperma* root were tested

for their microbial activities against eight gram-positive and five gram-negative with ten fungal strain and reported effective activity of chloroform, benzene and alcohol extracts [19]. The ethyl acetate extract of *S. oblonga* plant parts such as root, stem and leafs have displayed enormous antimicrobial activity [20]. The extracts were evaluated against pathogenic strains of gram-positive and gram-negative bacteria. The inhibitions of growth of bacteria were measured to assess the antibacterial activity. The ethanol extract of *S. oblonga* aerial and root extract exhibiting antibacterial activity against various human pathogens [21].

CONCLUSION

The plant extracts did not showed antibiotic activity, but negative result does not mean absence of bioactive compounds nor is that the species inactive. Active compounds may be present in insufficient quantities in the extract to show the activity. Lack of activity can thus only be proved by large dose level and the active compound present in high enough quantities. It is also showed, those gram-positive bacteria are more sensible than gram-negative because due to single layer cell wall in gram-positive bacterium. There are variations in antibacterial activities in species to species due to different phytochemicals in species to species.

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