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Antibacterial potential of eleven species of pteridophytes on Southern Tamil Nadu, India

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Abstract
To investigate the antibacterial potential of selected eleven species of pteridophytes of Southern Western Ghats, Tamil Nadu active against the three human bacterial pathogens. All the selected species of pteridophytes were air- dried, powdered and separately extracted with 90 % ethanol for cold method and their extracts were evaluated for an antibacterial activity was done by disk diffusion method. The results of the 90% ethanolic extract of all the selected pteridophytes had the best antibacterial activity observed against *Salmonella typhi*, *Vibrio cholerae* and *Pseudomonas aeruginosa.*

Keywords : Pteridophytes, extract, antibacterial activity, Pathogen

1 INTRODUCTION

Ferns and their fern allies are in a major division of the Plant Kingdom called as Pteridophyta, and they have been formed for millions of years. Ferns can grow in all climatic zones but show great diversity in the tropic regions [1]. They are found in damp and shady places in worldwide. About 12000 species are worldwide and 250 different genera of ferns [2] . Ferns are used as food, fooder, fiber and as ornamentals etc. [3]. Medicinal value of pteridophytes is known to man for more than 2000 years. Traditional knowledge of pteridophytes species have been used for biomedical and Ayurvedic systems of medicine, named as Sushruta (ca. 100 AD) and Charka (ca. 100 AD). Recently, some pteridophytes have been identified to possess antimicrobial properties. The antimicrobial potential of 114 species of pteridophytes have possessed antimicrobial activity [4]. Southern Western Ghats of Tamil Nadu have rich fern diversity more than 300 species are reported. Most of the pteridophytes have been used for the medicinal purposes. Hence, aim of the present study was evaluated for the antibacterial potential of eleven pteridophytes were observed by disk diffusion method.

2. MATERIALS AND METHODS

2.1 Collection of Plant Materials

The plant materials were collected from the Southern Western Ghat regions of Tamil Nadu. The selected experimental plant name viz. Adiantum capillus -veneris (Pteridaceae); Adiantum caudatum (Pteridaceae); Adiantum incisum (Pteridaceae); Adiantum lunulatum Burm. F (Pteridaceae); Adiantum philippens (Pteridaceae); Adiantum venustum (Pteridaceae); Athyrium attenuatum (Athyriaceae); Cheilanthes bicolor (Roxb.in Griff.) (Pteridaceae); Diplazium esculentum (Retz.) Sw.(Athyriaceae); Pteris cretica (Pteridaceae); and Selaginella chrysocaulos (Selaginellaceae).

2.2 Preparation of plant extracts

The powdered plant material (200 g) was extracted with ethanol for 48 hours in maceration method. The extract was filtered using a Buchner funnel and Whatman No.1 filter paper. The filtrate of ethanol extract obtained and dried for 48 h . The resulting extract was reconstituted with solvent to give desired concentrations used for the study.

2.3 Antibacterial activity

2.3.1 Tested Bacteria

Pathogens of *Salmonella typhi*, *Vibrio cholerae* and *Pseudomonas aeruginosa* were selected and tested in the present study. The selected, tested bacteria were sub-cultured on nutrient agar and incubated at 37° for 24 h and stored at 4° in the refrigerator to maintain stock culture.

2.4 Experimental study

2.4.1 Preparation of bacterial inoculum

An antibacterial assay was prepared by inoculating freshly grown bacterial culture in normal saline solution and the turbidity was matched with the 0.5 McFarland standard. Mueller-Hinton agar medium was employed in the agar disc

diffusion method. The Mueller-Hinton agar plates were seeded with bacterial inoculums aided with sterile swab and was allowed to dry for 30 min. Then on the seeded plates, sterile filter paper discs were placed, which were impregnated with 10µl of each extract (100 mg/500 µl of solvent). For negative control discs impregnated with ethanol was used. The plates were then incubated at 37° for 24 h. For negative control discs impregnated with each of the solvent was used. The plates were then incubated at 37° for 24 h.

Table-1: Antibacterial potential of eleven species of pteridophytes

Sl. No.	Plant Name	Zone of Inhibition (mm)		
		Salmonella typhi	*Pseudomonas aeruginosa*	*Vibrio cholerae*
1.	*Adiantum capillus*- veneris	12	17	9
2.	*Adiantum caudatum* L.	10	13	12
3.	*Adiantum incisum* Forsk.	14	15	13
4.	*Adiantum lunulatum* Burm. F	12	15	11
5.	*Adiantum philippens* L.	14	13	15
6.	*Adiantum venustum* D.Don	13	16	15
7.	*Athyrium attenuatum* C.B. Clarke	11	10	11
8.	*Cheilanthes bicolor* (Roxb.in Griff.)	11	12	13
9.	*Diplazium esculentum* (Retz.) Sw	13	11	12
10.	*Pteris cretica* L.	11	12	11
11.	*Selaginella chrysocaulos* (Hook. & Grev.) Spring	12	11	11

3. RESULTS AND DISCUSSION

In the present study, an antibacterial activity of selected pteridophytes species results were represented in the table-1. *Salmonella typhi*, *Vibrio cholerae* and *Pseudomonas aeruginosa* were the most susceptible bacteria to all fern extracts. The fern of *A. capillus*-veneris was maximum level active against *K. pneumonia* (Table-1). Gram - negative strain of *Salmonella typhi* is infect the intestinal tract and the blood and which is produced the disease typhoid fever. In the present study, observe that total of eleven pteridophytes species were active against *Salmonella typhi* while, both species of *Adiantum incisum* and *Adiantum philippens* were observed that more activity against *Salmonella typhi* (Table-1). Previous studies on methanolic extract of *drynaria quercifolia* (linn.) j smith rhizome was observed that moderately active against *Salmonella typhi*[5]. Gram-negative strain of *Vibrio cholerae, which is produced by the* cholera and it is caused by intestinal infection by the toxin-producing bacteria. In the present study, observed that a total of eleven pteridophytes species were active against *V. cholerae* while *Adiantum capillus- veneris* was observed that more activity against *V. cholerae.* Leaf glands of *Helminthostachys zeylanica* were observed that no activity against *Vibrio cholerae while moderate activity of* leaf glands of Dryopteris filix-mas was previously reported [6]. Gram-negative strains of *Pseudomonas aeruginosa*, which is causing infections in humans, mostly in hospital patients. It can cause pneumonia fever and infections in the blood. In the present study, observed that a total of eleven pteridophytes species were active against *Pseudomonas aeruginosa* while *Adiantum capillus- veneris* was observed that more activity against *Pseudomonas aeruginosa. The conclusion of the present study was observed that* all the tested gram-positive bacteria were more susceptible to the ethanolic extract of the all the fern species. In this result observed that may be due to the presence of active compounds present in the selected tested ferns. Further studies will be isolated and identify the active components, all the selected ferns.

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