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## **INVESTIGATION ON THE ANTIMICROBIAL PROPERTY OF *VITTARIA ELONGATA* SW. - A MEDICINAL FERN**

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### **ABSTRACT**

Present study investigated the antimicrobial property of *Vittaria elongata* a medicinal fern. The antimicrobial work was done by standard disc diffusion method. The bacteria exploited for the studies were *Salmonella typhi*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The fungal species *Aspergillus fumigates*, *Candida tropicalis*, *Candida albicans* and *Trichophyton mentagrophytes* were used for the analysis. The organic solvents like ethanol, chloroform, acetone and aqueous were used for the extraction. Among the four bacterial pathogens the zone of inhibition is higher in *Salmonella typhi*. Next to that *Pseudomonas aeruginosa* and *Staphylococcus aureus* showed little inhibition. There is no any inhibition zone in *Klebsiella pneumoniae*. In fungi, zone of inhibition was higher in *Candida tropicalis* and *Candida albicans*. *Aspergillus fumigates* and *Trichophyton mentagrophytes* were resistant to the extracts. Among the four solvent utilized ethanol and acetone has more effect and showed more inhibition.

**KEYWORDS:** *Vittaria elongata* Sw, organic solvents, antimicrobial activity.

## INTRODUCTION

The traditional system of medicine plays an important role in health care of rural and tribal people for all. The traditional knowledge in medicine plants has been well documented in Charaka Samhita and Shusruta Samhita (Kirtikar and Basu 1975). Traditional medicinal plants served as most important weapon against pathogen. According to study report it is found that about 85% of traditional medicines used for primary health care derived from plants and 65% medicines normally during the recent years. The domestic demand for traditional medicines in India has increased recently (Henry *et.al.*, 1996). The use of medicinal herbs in the treatment of skin disease including mycotic infections age old practice in many part of the world. This use has been supported by the isolation of active fungal compounds from plant extract. There is a necessity for screening the medicinal plants in order to get first hand information of their antimicrobial properties which might serve as a guide for those who are interested in this field. Pteridophytes grows luxuriantly in moist tropical and temperate forests out of 12,000 sps of Pteridophytes that occur in the world flora more than 1000 sps belongs to 70 families and 191 genera likely to occur in India. 1000 sps Pteridophytes occurring in India 170 sps have been found to be used as food flavour, dye medicine, bio fertilizer, oilfiber and biogas production.

Pteridophytes are seedless spore bearing vascular cryptogams which occupy position between the lower non seed bearing plants and form a generally much neglected group of plants. Pteridophytes are called as reptile group and one of the indigenous people are not well known about the use of Pteridophytes. It is not easily available like biodiversity economic and medicinal values of higher plants have been known investigated thoroughly, unfortunately Pteridophytes have been ignored. The medicinal value of ferns has been known to more than 2000 years. The Greek botanist Theophrastus has referred to the medicinal value of ferns in his book *historia plantarum*. A synthetic survey of antimicrobial activity against both gram positive and gram negative.

## MATERIALS AND METHOD

### Collection of plant material

The ferns were collected from the natural habitat of the kolli hills at Kullivalivu. Collected ferns were shade dried at room temperature and made into powder.

### Description of plant

*Vittaria* is genus of fern in the vittariodaea the family Pteridaceae. *Vittariaspp* consist of epiphytes, simple, entire narrowly lined fronds.

### Preparation of plant extract

A known quality 50g of the dried powder was soaked in 150ml of Ethanol,

Chloroform, Aqueous, and Acetone separately in bottles and closed with corks kept for 2hr at 31°C until complete exhaustion of the material. Each mixture was stirred at every 24hr using a sterile glass rod at the end of the 72hrs each extract was passed through whatmann's no.1 filter paper to collect the crude extract.

### **Antimicrobial assay**

In bacteria *Salmonella typhi*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *staphylococcus aureus*. In fungi *Aspergillus fumigates*, *Candida albicans*, *Candida tropicalis*, *Trycophyton mentagrophytes* were procured from the Joseph's microbial culture centre(JMCC).Were used as indicator strains disc diffusion method(MARUZELLA AND HENRY 1958) and between strains and disc as used to test antimicrobial activity.Dried and sterilized filter paper discs (6 mm diameter) were then impregnated with different organic solvent of plant extract usingmicropipette.Discs containing the test material were placed onnutrient agar medium uniformly seeded with the test micro-organisms. Standard antibiotics chloroamphenicol for bacteria. Gentamicin were used for fungi these are positive controls. These plates were then kept at low temperature (4°C) for 24 h to allow maximum diffusion. There was a gradual change in concentration in the media surrounding discs. The plates were then

incubated at37°C for 24 h to allow maximum growth of the organisms. The test materials having antimicrobial activity inhibited the growth of the microorganisms and a clear, distinct zone of inhibition was visualized surrounding the medium. The antimicrobial activity of the test agent was determined by measuring the diameter of zone of inhibition expressed in millimeter. The experiment was carried out three times and the results were the mean of three replicates.

### **RESULTS**

In the present work, at first the ferns having antimicrobial activity are screened and selected. Antibacterial activity results showed in Table – 1. Whereas antifungal activity showed in Table 2.

#### **Antibacterial activity**

##### ***Aqueous extract***

There was activity against *Salmonella typhi*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* in the aqueous extract. There is more resistance to this extract. It was little effective against *staphylococcus aureus* (0.5±0.3).

##### ***Acetone extract***

Antibacterial activity was determined against four different species. Out of which *Pseudomonas aeruginosa* (1.7cm). next to that *staphylococcus aureus* showed moderate level of inhibition (0.6cm). The antibiotic extract of *V. elongata* did not show any activity against the remaining bacterial

species such as *Salmonella typhi*, *Klebsiella pneumoniae*.

#### **Chloroform extract**

*Salmonella typhi* only showed the significant inhibition among all the four tested bacterial species. There was no activity against all the remaining three bacteria such as *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*.

#### **Ethanol extract**

Ethanol extract was effective among four bacterial species. Among *Staphylococcus aureus* showed higher inhibition (1.1cm) both *Salmonella typhi*, *Pseudomonas aeruginosa* showed same degree of inhibition against ethanol leaf extract (1.0± 0.5) *Klebsiella pneumoniae* was least effective against this extract.

**Table 1. Antibacterial activity of various extracts of *Vittaria elongata* Sw against various bacteria (Disc diffusion method)**

Microorganism (Bacteria)	Zone of inhibition in cm (Mean)				Standard Antibiotic Chloroamphenicol
	Aqueous Extracts	Acetone Extracts	Chloroform Extracts	Ethanol Extracts	
<i>Salmonella typhi</i>	–	–	1.3 ± 0.7	1.0 ± 0.2	2.5
<i>Klebsiella pneumoniae</i>	–	–	–	0.8 ± 0.4	2.4
<i>Pseudomonas aeruginosa</i>	–	1.7 ± 0.6	–	1.0 ± 0.5	2.2
<i>Staphylococcus aureus</i>	0.3 ± 0.2	0.6 ± 0.3	–	1.1 ± 0.1	2.3

#### **Antifungal activity**

##### **Ethanol extract**

Ethanol leaf extract have more effective against *Trycophyton mentagrophytes* (1.1±0.9cm) among four fungal species should higher inhibition (0.7±0.2cm) followed by *Candida tropicalis*. There was no activity against *Aspergillus fumigatus*.

##### **Chloroform extract**

Chloroform extract leaf extract are more effective against *Trycophyton mentagrophytes* (1.2 ± 0.2). Next to that *Aspergillus fumigatus* (1.1±0.3cm) extract against *Candida albicans* showed least differed of inhibition. Chloroform extract did not show any activity against *Candida tropicalis*.

##### **Acetone extract**

*Candida tropicalis* (1.1±0.4cm) only showed significant inhibition. There was no activity other three species.

### *Aqueous extract*

Among four extracts *Aspergillus fumigatus* (0.8cm) & *Candida albicans* (0.4cm) only showed the inhibition

against the aqueous extract. There was no activity in the remaining two fungal species of this extract.

**Table 2. Antifungal activity of various extracts of *Vittaria elongata* Sw against various bacteria (Disc diffusion method)**

Microorganism (Fungi)	Zone of inhibition in cm (Mean)				Standard Antibiotic Gentamicin
	Aqueous Extracts	Acetone Extracts	Chloroform Extracts	Ethanol Extracts	
<i>Aspergillus fumigatus</i>	0.8± 0.3	–	1.1± 0.3	–	1.0
<i>Candida tropicalis</i>	–	1.1± 0.4	–	0.7± 0.2	2.0
<i>Candida albicans</i>	0.4± 0.1	0.4± 0.2	0.5± 0.2	0.9± 0.2	1.8
<i>Trycophyton mentagrophytes</i>	–	0.6± 0.1	1.2± 0.2	1.2± 0.9	1.5

### DISCUSSION

When control to the Invitro antifungal activity using micro dilution method of *Aspergillus fumigatus* exhibited strong inhibition towards the (Afroz alam 2012). It can be depicted that the ethanolic extract *Adiantum truddiamum* had significant antimicrobial activity against both the test organism *Staphylococcus aureus*(15mm) and *Pseudomonas aeruginosa* (23mm) (Deepshikha Sharma et al 2013).

*Christillaparasitica* was known to possess antimicrobial activity against *staphylococcus aureus* and *Pseudomonas aeruginosa* (Manikam et al., 2005). In *Adiantum capillus the methanol extract have good activity followed by petroleum*

etherextract that shows moderate activity against all tested pathogen such as *Staphylococcus aureus* *Klebsiella pneumoniae* results are observed in *Adiantum capillus* plant extract against tested bacterial (Parihar et al 2010).

### CONCLUSION

The leaf extract of *Vittaria elongata* were tested against the bacterial and fungal species. There was a significant inhibition of bacterial and fungal pathogen aqueous, acetone, alcohol and chloroform were used as a solvent. The disc diffusion methods were used for the antimicrobial activity. Among the four bacterial pathogens the zone of inhibition higher *Salmonella typhi*, next to that *Klebsiella*

*pneumoniae* showed the little inhibition. *Staphylococcus aureus* also showed the least inhibition. Likewise in fungal pathogen zone of inhibition higher degree in *Candida tropicalis*, next to that *Candida albicans* showed the little inhibition. The disc diffusion method is fine method which shows clear result. The conclusion this work is *Vittaria elongata* acted against the microbes. These extracts may be helpful to extract antimicrobial substance for human therapy.

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