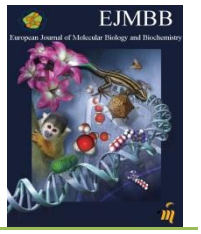
e - ISSN - 2348-2206
Print ISSN - 2348-2192

European Journal of Molecular Biology and Biochemistry

Journal homepage: www.mcmed.us/journal/ejmbb



PRELIMINARY PHYTOCHEMICAL AND ANTIMICROBIAL INVESTIGATIONS OF *ELYTRARIA ACAULIS* (L.F.) LINDAU.

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Article Info

Received 23/01/2015
Revised 16/02/2015
Accepted 23/02/2015

Key words:-
Phytochemisty,
Bioactive compounds,
Elytraria acaulis,
Biological activity.

ABSTRACT

Medicinal plants have been used for centuries as remedies for human diseases because they contain components of therapeutic value. Herbs are now very popular in developing countries on account of improved knowledge about the safety, efficacy and quality assurance of ethno medicine. In recent years, secondary plant metabolites (phytochemicals) have been extensively investigated as a source of medicinal agents. In the present investigation preliminary phytochemical and antimicrobial investigation of *Elytraria acaulis* was carried out. The plant material was powdered and successively extracted with different solvents based on their polarity. The methanolic extracts of the plant shows the presence of many secondary metabolites compared to other solvents. The different parts of the plant extracts showed broad spectrum of antimicrobial activity against some human pathogens.

INTRODUCTION

Medicinal plants are a source of great economic value all over the world. Nature has bestowed on us a very rich botanical wealth and a large number of diverse types of plants grow in different parts of the country. Herbal medicine is still the main stay of about 75-80% of the whole population, and the major part of traditional therapy involves the use of plant extract and their active constituents. In Indian system a large number of medicinal plants have been used for many centuries for treating various diseases. Medicinal plants have been used for centuries as remedies for human diseases because they contain chemical components of therapeutic value [1]. The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents [2]. Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds [3]. Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities [4]. Terpenoids are very important in attracting useful mites and consume the herbivorous insects [5]. Alkaloids are used as anaesthetic agents and are found in medicinal plants [6]. With this background the present study aimed at specifically determining the phytochemical and antimicrobial properties of *Elytraria acaulis* on selected microorganisms in order to determine its medicinal use.

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MATERIALS AND METHODS

Plant Material

Mature and healthy plants of *Elytraria acaulis* (L.f) Lindau. belonging to the family Acanthaceae was collected from Vallanadu hills, Thoothukudi district of Tamil Nadu, India. The specimens were identified and documented in the herbarium of St. Xavier's College (Autonomous), Palayamkottai (XCH 28087), Tamilnadu, India.

Preliminary phytochemical analysis

The air-dried and powdered plant materials were taken in different amber colored bottles, successively extracted with petroleum ether, chloroform, ethanol and water. The extracts thus obtained from each plant were then subjected to qualitative tests for the identification of various plant constituents by the methods described by Brindha *et al.* (1981). The preliminary phytochemical screening is a qualitative chemical evaluation which indicates spectrum of chemical constituents in the chosen plant.

Antimicrobial Activity Assay

Antibacterial activity was carried out using different extracts and modified agar disc diffusion method [7,8] against ten randomly selected microbial strains such as *Escherichia coli, Mycobacterium luteus, Mycobacterium smegmatics, Enterobacter aerogenes, Proteus vulgaris, Staphylococcus aureus, streptococcus, Bacillus subtilis, Salmonella, Vibreo* and *Lactobacillus*. The selected microbial strains were obtained from Department of Microbiology, Sri. Paramakalyani College, Alwarkuruchi, Tirunelveli District. All bacterial species were maintained on nutrient agar medium for 36 hr. old bacterial culture were inoculated into nutrient broth and incubated at 37±20C on rotary shaker at 100 rpm. After 36 hr. incubation, bacterial suspensions were used for further tests.

RESULTS AND DISCUSSIONS

Preliminary Phytochemical Analysis

The petroleum ether, chloroform, benzene, methanol and distilled water extracts of *Elytraria acaulis* were subjected to qualitative preliminary phytochemical analysis with different chemical reagents. The results are tabulated in table 1. Steroid was found in Benzene, Chloroform and petroleum ether extracts. Sugar was present in all the extracts except benzene and water extracts. Saponin was reported in Benzene and chloroform extracts. Triterpene was found only in methanol extract. Phenolic compound was found only in methanol extract. Flavanoid was only found in water extract. Protein was found only in methanol extract. Tannins were found only in benzene extract. Reducing sugar, Alkaloid, Catachin, Anthraquinone, Amino acid were absent in all the extracts.

Methanol extracts exhibited only five positive preliminary phytochemical tests against thirteen tests. Steroid, triterpene, sugar, phenolic and protein were positive with methanol extract and steroid, saponin, tannins were positive with benzene extract and steroid, sugar, saponin were positive with chloroform extract and flavanoid was positive with water extract and sugar was positive with petroleum ether extract. Collectively methanol extract showed more positive results against the preliminary phytochemical tests.

These secondary metabolites contribute significantly towards the biological activities of medicinal plants such as hypoglycemic, antidiabetic, antioxidant, antimicrobial, anti-inflammatory, anti-carcinogenic, antimalarial, anticholinergic, anti-leprosy activities etc [9].

Tannins have amazing stringent properties. They are known to hasten the healing of wounds and inflamed mucous membranes. Flavonoids are potent water-soluble antioxidant and free radical scavenger, which prevent oxidative cell damage and also have strong anticancer activity [10, 11]. It also helps in managing diabetes induced oxidative stress. Terpenoids have been found to be useful in the prevention and therapy of several diseases, including cancer. Terpenoids are also known to possess antimicrobial, antifungal, anti-parasitic, antiviral, anti-allergenic, antispasmodic, antihyperglycemic, anti-inflammatory and immunomodulatory properties [12, 13]. In addition, terpenoids can be used as protective substances in storing agriculture products as they are known to have insecticidal properties as well [14]. Moreover, alkaloids represent a class which affects the central nervous system, reduces appetite and behaves as diuretic [15].

Antimicrobial Activity

The agar disc diffusion method was employed for the determination of antimicrobial activity of the crude extracts such as petroleum ether, chloroform, benzene, methanol and distilled water extracts of *Elytraria acaulis.* The diameter of the inhibition zones around the disc gives a measure of microbial growth inhibition. All tests were performed in triplicate. The results of the zones of inhibition (mn) are summarized in Table 2 and Figure 1.

Bacterial infection is one of the most serious global health issues in 21st century. The emergence of bacterial resistance to antibiotics is a major health problem and therefore, it is critical to develop new antibiotics with novel mechanism of action to overcome these problems [16]. In the present investigation the methanol extracts of *Elytraria acaulis* showed potent antimicrobial activity against all the selected micro-organisms. Benzene and cholorform extract of the same material showed rather good activity with the selected strains. However petroleum ether and water extracts did not show any significant activity. The zone of inhibition ranges from 8 to 24 mm. The methanol extract exhibited moderate inhibition against *Escherichia coli* (9mm), *Mycobacterium luteus* (6mm), *Mycobacterium smegmatics* (16mm), *Enterobacter aerogenes* (7mm), *Proteus vulgaris* (9mm), *Staphylococcus aureus* (10mm), *streptococcus* (9mm), *Bacillus subtilis* (6mm), *Salmonella* (7mm), *Vibreo* (11mm) and *Lactobacillus* (8mm). The methanol extract developed highest inhibition zone against the three inoculates such as *Mycobacterium smegmatics* (16mm), *Vibreo* (11mm) and *Staphylococcus aureus* (10mm) whereas lesser zone of inhibition was observed aginst two strains like *Mycobacterium luteus* (6mm) and *Bacillus subtilis* (6mm). The remaining inoculates showed a moderate zone of inhibition. Among all the selected micro-organisms *Mycobacterium smegmatics* with methanolic extract formed a 16mm zone of inhibition which was higher in value than the control.

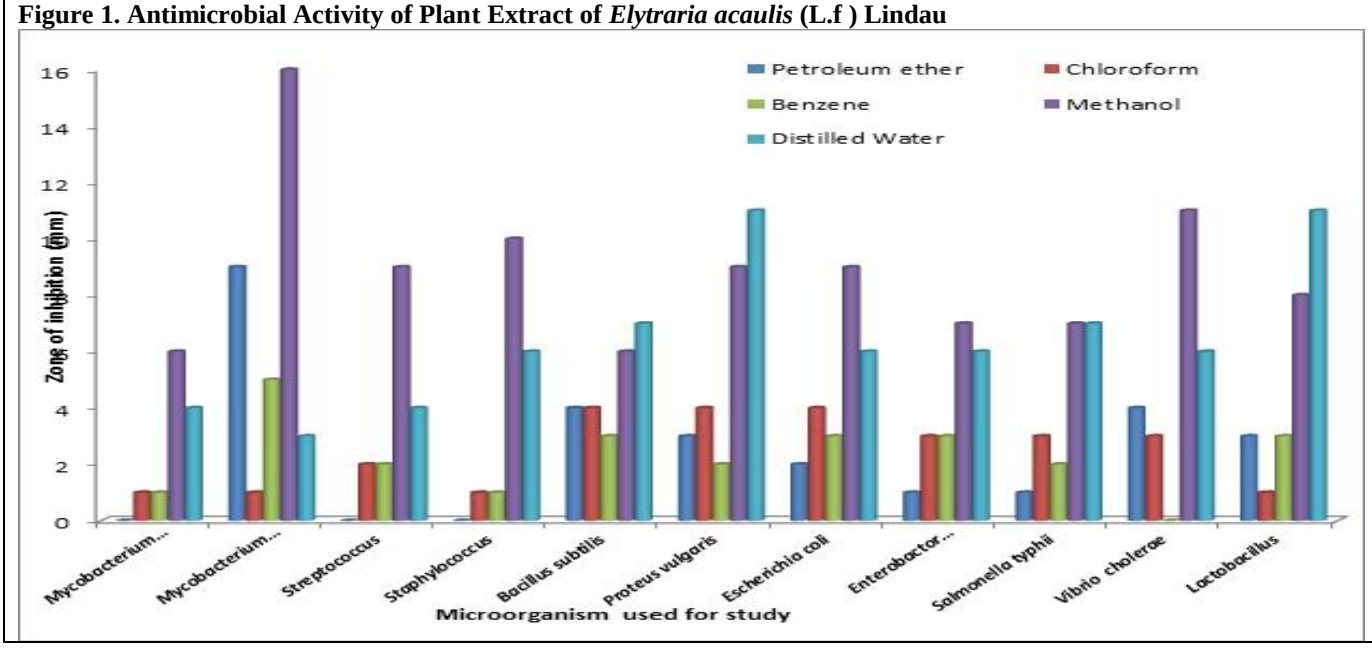
Table 1. Preliminary phytochemical analysis of plant extracts (*Elytraria acaulis*)

S. No	Compounds	Petroleum ether	Chloroform	Benzene	Methanol	Distilled water
1.	Steroids	+	+	-	+	-
2.	Triterpenoids	-	-	-	+	-
3.	Sugar	-	+	-	+	-
4.	Reducing sugar	-	-	-	-	-
5.	Alkaloids	-	-	-	-	-
6.	Phenols	-	-	-	+	-
7.	Flavanoids	-	-	+	-	-
8.	Protein	-	-	-	+	-
9.	Catechine	-	-	-	-	-
10.	Saponins	+	+	-	-	-
11.	Tannins	+	-	-	-	-
12.	Anthroquinone	-	-	-	-	-
13.	Amino acids	-	-	-	-	-

Table 2. Antimicrobial activity of plant extracts of *Elytraria acaulis*

S. No	Name of the Microbes	Petroleum ether (mm)	Chloroform (mm)	Benzene (mm)	Methanol (mm)	Distilled Water (mm)
1	***Mycobacterium luteus***	**0**	**1**	**1**	**6**	**4**
2	***Mycobacterium smegmatics***	**9**	**1**	**5**	**16**	**3**
3	***Streptococcus***	**0**	**2**	**2**	**9**	**4**
4	***Staphylococcus***	**0**	**1**	**1**	**10**	**6**
5	***Bacillus subtilis***	**4**	**4**	**3**	**6**	**7**
6	***Proteus vulgaris***	**3**	**4**	**2**	**9**	**11**
7	***Escherichia coli***	**2**	**4**	**3**	**9**	**6**
8	***Enterobactor aeroginosa***	**1**	**3**	**3**	**7**	**6**
9	***Salmonella***	**1**	**3**	**2**	**7**	**7**
10	***Vibrio cholerae***	**4**	**3**	**0**	**11**	**6**
11	***Lactobacillus***	**3**	**1**	**3**	**8**	**11**

Figure 1. Antimicrobial Activity of Plant Extract of *Elytraria acaulis* (L.f) Lindau



CONCLUSION

The preliminary phytochemical analysis of the various extracts of powder of all the plant was performed and the results obtained are presented. The dominant presence of steroid, sugar and saponin is reported in the chosen plant extracts. In the present study, petroleum ether

and chloroform did not show good result but methanol extracts show moderate antimicrobial activity. Methanol and water extracts were proven to be most effective against the selected organisms. Antimicrobial activity of the few isolated compounds of the chosen plants showed better results than the extracts. Present investigation reported that this plant is warehouse of chemo-diversity which will be useful in screening for medicines like steroids, alkaloids, phenolics, flavanoids and some other chemicals. Antibacterial activity conclude that this plant stop bacterial growth. The results are encouraging but scientific scrutiny is absolutely necessary before being put in practice.

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