EVALUATION OF ANTIMICROBIAL PROPERTIES OF *Pedalium murex* L. AGAINST CLINICAL MICROBES

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ABSTRACT

Medicinal plants have phytochemical compounds which are used for curing of various human disease and play an important role in ailments. In the present investigation suggested that the phytochemical constituents like alkaloids, flavonoids, phenols, phlobatannin, tannin, terpenoids, protein, reducing sugar, saponins and steriods were recorded in leaf of *Pedalium murex* by quantitatively with two different solvents such as aqueous and methanol used for extraction. The quantitative analysis of phytochemical compounds was maximum production *from Pedalium murex*. It was 0.78±0.07, 0.53±0.04, 0.41±0.09, 0.45±0.07, 0.53±0.03, 0.39±0.08, 0.50±0.11, 0.58±0.09 and 0.69±0.05mg/g recorded with alkaloids, flavonoids, phenols, phlobatannin, tannin, terpenoids, protein, reducing sugar, saponins and steroids compounds were quantitatively represented in the respective plants of methanolic extract has extraordinary productions than the aqueous extract. The antimicrobial effect of *Pedalium murex* leaf with methanolic extract was analysed against clinical microbes. The antibacterial activity of *P. murex* leaf extract of different concentration was treated against clinical microbes. The higher concentration of 100µl has maximum potential activity was 3.33±11.1, 26.3±8.76, 28.3±9.43 and 22.6±7.53mm zone of inhibitions observed respectively whereas the antifungal properties of *P. murex* with higher concentration of 100µl has excellent antifungal activity of 23.0±7.66, 22.3±7.43, 21.3±7.11and 23.3±7.76mm zone of inhibition recorded against clinical fungi respectively. The *P. murex* leaf extract was more sustainable for antimicrobial property.

Key words: *Pedalium murex* L., phytochemical,

INTRODUCTION

The medicinal value of plants has been documented in almost all ancient civilizations. The plants are the store house and natural source of drugs, most of the present drugs are derived directly or indirectly from these botanicals. Each part of the plant like leaves, stem, flower, fruits, bark, roots and seeds are known to have various medicinal properties. These plant based systems continue to play an essential role in health

care, and it has been estimated by the World Health organization that approximately 80% of the world population still depends mainly on traditional medicines for their primary health care. Medicinal plants which form the backbone of traditional medicines intense pharmacological studies. Plant derived drugs served as a prototype to develop more effective and less toxic medicines. The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavonoids, phenols, saponins, steriods etc. There is a growing attention in correlating the phytochemicals of a medicinal plant with its pharmacological activity (Prachayasittikul *et al*., 2008). Alkaloids are a class of chemical compounds contains a nitrogen ring. Alkaloids are produced by a large variety of organisms including bacteria, fungi, plants, animals and are part of the group of natural products. Alkaloids are used as local anesthetic, analgesic, antibacterial, antifungal, anticancer, antihypertension agent, vasodilator, antiarhythmia, anti-asthma and antimalarial drug.

MATERIALS AND METHODS

COLLECTION OF SAMPLE

Collection of plant materials

Healthy plants *Pedalium murex* L. was collected from Mariyamman kovil, Thanjavur, Tamilnadu, India. The leaf materials were cleaned and free from dirt particles and shade dried.

Preparation of plant extracts (Harbone, 1957)

Soxhlet method used for extraction of crude compounds. Twenty gram of powder leaves blended with 50 ml of different solvents separately (aqueous and methanol) for different periods with agitation at room temperature. After the plant extracts were allowed to filtration by using a 0.45 Millipore filter paper. Then, the plant extracts concentrated using a rotary evaporator at 40°C under reduced pressure. Finally, the extracts were allowed to weigh and store at -20°C till their usage in the different tests.

PHYTOCHEMICAL ANALYSIS

The phytochemical screening of extracts were performed by standard method as described by Brinda *et al*. (1981); Savithramma *et al*. (2011). Phytochemical screening was carried out on the leaf extracts using two different solvents to identify the major natural chemical groups such as tannins, saponins, flavonoids, protein, reducing sugar, phlobatannin, phenols, terpenoids, alkaloids, and steroids. General reactions in these analyses revealed the presence or absence of these compounds in the two different leaf extracts used in the test.

ANTIMICROBIAL ACTIVITY (Kurutepe *et al*., 1999)

Assay of antimicrobial activity of medicinal plant leaf with methanolic extract was done by agar well diffusion method.

Well Diffusion Method

The Mueller Hinton agar plates for bacteria and PDA for fungi were prepared to the swabbed on the petri plates using the bacteria and fungal cultures were inoculated with the help of sterile cotton swabs. Four wells were made with cork borer. Different concentrations (25µl- 100µl) of leaf extracts were in the wells. Then the plates were incubated at 37˚C for 48 hours. After incubation period, zone of inhibition were measured and recorded. Control plates were prepared without plant extract. The tests were performed in triplicates for each microorganism evaluated and the final results were presented as the arithmetic average. The inhibition zones were measured in millimetres. The results obtained from leaf extract were compared to know the effectiveness of leaves against microbes.

RESULTS

Plate 1: Qualitative phytochemical analysis of *Pedalium murex* L. in leaf different extract

Name of the compounds	Inference	
	Aqueous	Methanol
Alkaloids	–	+
Flavonoids	+	+
Saponin	+	+
Tannin	+	+
Phenol	+	+
Steroids	+	+
Terpenoids	+	+
Protein	+	+
Reducing sugar	+	+
Phlobatannin	+	+

+ (Present), - (absent)

Plate 2: Quantitative phytochemical analysis of *Pedalium murex* L. leaf with different solvent

Name of the phytoconstituents	Quantity (mg/g)	
	Aqueous	Methanol
Alkaloids	-	0.53±0.08
Flavonoids	0.72±0.11	0.78±0.07
Saponin	0.34±0.09	0.53±0.04
Tannin	0.26±0.06	0.41±0.09

Steroids	0.29±0.08	0.45±0.07
Terpenoids	0.38±0.12	0.53±0.03
Protein	0.34±0.05	0.39±0.08
Reducing sugar	0.47±0.11	0.50±0.11
Phlobatannin	0.55±0.12	0.58±0.09
Phenol	0.66±0.10	0.69±0.05

Standard deviation ±error

Table 3: Antibacterial activity of *Pedalium murex* leaf of methanol extract

	Zone of inhibition (mm)			
Name of the bacteria	25µl	50µl	75µl	100µl
Aeromonas sp	16.0±5.33	25.2±8.33	33.3±11.1	3.33±11.1
E.coli	16.0±5.33	23.0±7.66	24.6±8.20	26.3±8.76
K.pneumoniae	23.6±7.53	25.0±8.33	27.2±9.00	28.3±9.43
Pseudomonas aeroginosa	10.2±3.33	12.2±4.22	20.3±10.2	22.6±7.53

Standard deviation ±error

Table 4: Antifungal activity of *Pedalium murex* leaf of methanol extract

	Zone of inhibition (mm)			
Name of the fungi	25µl	50µl	75µl	100µl
Aspergillus flavus	19.3±6.43	17.3±5.76	22.0±7.33	23.0±7.66
A.niger	22.0±7.33	16.2±5.33	20.3±6.76	22.3±7.43
A.terreus	13.6±4.53	22.2±7.33	18.6±0.91	21.3±7.11
Penicillium sp	19.6±6.53	22.3±7.33	22.6±7.86	23.3±7.76

Standard deviation ±error

DISCUSSION

Preliminary qualitative analysis is useful in the detection of phytochemical principles and subsequently may lead to development of new drug discovery (Mallikharjuna *et al*., 2007). In earlier studies the preliminary phytochemical investigations was performed in leaf and entire plant of *H. enneaspermus*

indicated aqueous and methanol extracts revealed high secondary metabolites (Awobajo *et al*, 2009) (Remya *et al*., 2018). The results of the present study showed that the aqueous and methanol leaf extract of *Pedalium murex* is rich in secondary metabolites and it is followed by methanol extracts (Table 1-2). The complete phytochemical investigations of medicinal plants of India should be carried out because these secondary metabolites are responsible for medicinal activity of the plant (Savithramma, *et al*., 2011). The secondary metabolites contribute significantly towards the biological activities of medicinal plants such as hypoglycemic, antidiabetic, antioxidant, antimicrobial, anti-inflammatory, anticarcinogenic, antimalarial, anticholinergic and antileprosy activities were performed (Negi *et al*., 2011).

Antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world. The world health organization estimates that plant extract or their active constituents are used as folk medicine in tradition therapies of 80% of the worlds population. In the present work, aqueous and methanol from *Pedalium murex* showed strong activity against most of the tested bacterial and fungal strains. In this screening work, plant extracts of *Pedalium murex* were found to be when we compare zone of inhibition of various extracts treated strain maximum zone of inhibition was observed for methanolic extract treated strain for antibacterial and antifungal strains. The claimed uses of leaves in the traditional system of medicine to treat various infectious disease caused by the microbes. Therefore, it may be concluded from the above results, that the crude extracts obtained from the leaves of *Pedalium murex* used enough as drug to treat disease caused by those microbes. But before use in human being isolation of the medicinal plant extract for better evaluate the potential effectiveness of the crude extracts as the antimicrobial agents (Upadhayay Ashutosh *et al*., 2017).

In the present investigation suggested that the antibacterial activity of *Pedalium murex* leaf with methanolic extract with different concentration of 25, 50, 75 and 100µl was treated against *Aeromonas* sp, *E.coli, K.pneumonia* and *Pseudomonas aeroginosa* were observed. The higher concentration of 100µl was 3.33±11.1, 26.3±8.76, 28.3±9.43 and 22.6±7.53mm zone of inhibition recorded with respective plant. When compared with low concentration of *Pedalium murex* leaf extract. The effect of antifungal properties of *Pedalium murex* leaf with methanolic extract extraordinary antifungal activity against *A.niger* than the other tested fungi. Surprisingly even in the low concentration of 25µl has also been excellent activity against *A.niger* were observed. The higher concentration of 100µl plant extract was 23.0±7.66, 22.3±7.43, 21.3±7.11and 23.3±7.76mm zone of inhibition represented respectively. It can be concluded that the study had potential antimicrobial activity by the medicinal plants and scientific variation of good activity in the search of new drugs (Table 3-4).

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