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Bactericidal-like activity of methanolic leaves extract of *pedalium murex*

Abstract

Plants have been found for numerous potentials for treating and managing diseases. Biologically active phytochemical constituents are essential for the therapeutic activities of plants. The present study was based on the bactericidal evaluation of methanolic leaves extract of *P. murex* against *A. Niger, A. Flavus, E. Coli & S. epidermidis*. The leaves extract of *Pedalium murex*, ciprofloxacin, peptone, beef extract, agar, NaCl, distilled water, rotatory evaporator, weighing machine and methanol were procured for the study. The leaves of *Pedalium murex* were obtained from the Bareilly reason, UP. It was identified and authenticated by a botanist. Then, nutrient media was prepared using agar, peptone etc. Disc diffusion method was employed to determine the anti-bacterial action of the extract (test) & ciprofloxacin (std.). The % yield was obtained as 68% for leaves of *P. murex*. In results, leaves extract of *P. murex* demonstrated a remarkable antibacterial action. It resembles to standard group in their efficacy. In disc diffusion method, antibacterial effect was found maximum against *S. epidermidis* amongst all. It concludes, that leaves of *P. murex* are effective in the prevention of bacterial growth & infection. It suggests, to recognize and isolate the responsible moieties responsible for this pharmacological action and dosage forms to be developed as well.

Keywords: *Pedalium murex,* methanolic extract, antibacterial, *S. epidermidis, E. coli*

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Introduction

Plants have been found for numerous potentials for treating and managing diseases.[1] Biologically active phytochemical constituents are essential for the therapeutic activities of plants.[2] Plants have various therapeutic benefits because they contain active substances having biological effects on human health.[3] Plants possess phytochemicals such as alkaloids, flavonoids, terpenoids, steroids, tannins, glycosides, steroids, carotenoids, and other phenolic compounds, which serve specific functions in herbal therapy.[4,5] The antibacterial and antiviral activities are entirely related to molecules that kill bacteria and viruses selectively or decrease their rate of development without being harmful to nearby tissues.[6] Microbiologists such as Louis Pasteur and Jules Francois Joubert recognised antagonism between bacteria in the nineteenth century and debated the advantages these interactions in medicine.[7]

Pedalium murex is also called as Gokhru. The sesame family-Pedaliaceae, includes this plant. The Pedaliaceae family includes 14 genera and 70 species, includes Pedalium murex.[8] Leaves are uneven in shape, alternate, repandangulate, and in pairs of 5-8, and a pedicel with a pair of yellow glands. The flowers are tiny and yellow. The fruits are spherical and contain one seed in each of their 5 to 12 compartments. Aromatic oil is found in the seeds. The roots are around 4 to 5 inches long, brown in colour, and delicious in taste. The shrub begins to flower in the early winter and then bears fruit. A succulent herb called *P. murex* can be found in South India's coastal regions as well as other tropical parts of the country. Between July and September, it takes place. When the temperature is between 25 and 30°C, it grows well as a weed on fertile soils and crops.[9]

The leaves & root contains a variety of compounds, including saponins, reducing sugars, phenolic compounds, alkaloids, triterpenoids, xanthoproteins, and flavonoids. The leaves contain flavonoids, alkaloids, resins, steroids, saponins, and proteins.[10] The present study was based on the antibacterial evaluation of methanolic leaves extract of *P. murex* against *A. Niger, A. Flavus, E. Coli & S. epidermidis.*

Materials and methods

Experimental requirements

Leaves extract of *Pedalium murex*, ciprofloxacin, peptone, beef extract, agar, NaCl, distilled water, rotatory evaporator, weighing machine and methanol.

Identification and extraction of plant

The leaves of *Pedalium murex* were obtained from the Bareilly reason, UP. It was identified and authenticated by a botanist at MJPRU Bareilly. The leaves were washed making dust-free and dried in shade at room temperature. Then, dried leaves were rendered into coarse powders and then finally into fine ones. The powder was weighed and soaked into methanol solvent for fifteen days with gradual stirrings.[11]

Preparation of nutrient agar

Peptone-5g, beef extract-5g, and NaCl-2.5g were weighed, diluted in 400ml distilled water and warmed in a 500ml volumetric flask. In warm distilled water (50ml), agar (10g) was dissolved. The two solutions were admixed and distilled water was used to volume makeup up to 500ml. This nutritional agar media was kept in autoclave and sterilised for 30 minutes at 15lb/inch^2 pressure and 121ºC temperature.[12]

Antimicrobial activity

Disc diffusion method

a. Test plate- Dried nutrient agar plates were kept for 30 minutes at 37°C. Using a sterilised glass spreader, a 0.5ml overnight culture of several bacterial strains was applied to the agar plate's surface and incubated at 37 °C for 30 min. P. murex was added in a variety of quantities on sterile, blank, 6mm antimicrobial susceptibility discs. The infected surface of the agar plate was kept covered with the extract-impregnated discs.

b. Positive controlled plate- Nutrient agar media was placed into this plate, and once it had solidified, inoculum had been applied to the surface. But no medication solution is present in this petri dish.

c. Standard plate- Nutrient agar medium was poured and after its solidification, inoculum was spread over the surface (incubated for 30min). Then drug- ciprofloxacin was added in diluted form.

After their respective treatments, the agar plates incubated overnight at 37°C and at last the zones of bacterial inhibition recorded.[13]

Results and discussion

Extraction yields

The % yield was obtained as 68% for leaves of *P. murex*.

Antibacterial activity (Disc diffusion method)

The antibacterial effect was evaluated by using disc diffusion method- a most reliable procedure to determine the antibacterial action. The antibacterial action was evaluated at concentrations of 25µg/ml, 50µg/ml, 100µg/ml, & 200µg/ml. The ZOI was recorded in mm.

Zone of inhibition was compared with control and standard group- treated with ciprofloxacin in the same dilution as test used. The highest ZOI was recorded against *S. epidermidis* at both, lower and higher doses. ZOI was estimated as 6.28±0.13**mm and 8.31±0.23***mm at 25µg/ml and 50µg/ml, respectively. The same was recorded as 5.85±0.23*mm and 6.97±0.14**mm at 25µg/ml and 50µg/ml, respectively that was lowest amongst all. The following table 1 depicts the antibacterial potential.

Similarly, in *S. epidermidis* ZOI was recorded as 12.32±0.29***mm and 15.98±0.58**mm at the dose of 100µg/ml & 200µg/ml, respectively that was greatest against all the microorganisms used in the screening. In *A. niger*, the inhibition zone was recorded as 10.38±0.33**mm and 13.27±0.29**mm at the dose of 100µg/ml & 200µg/ml, respectively. It demonstrated as active antibacterial agent when observed with ciprofloxacin treatments (Table 2).

Table 1 Antibacterial role of *P. murex* methanolic leaves extract and Ciprofloxacin at 25µg/ml & 50µg/ml against *A. Niger, A. Flavus, E. Coli* & *S. epidermidis*

Strains	Zone of inhibition (mm)			
	P. Murex leaves extract		Ciprofloxacin	
	25µg/ml	50µg/ml	25µg/ml	50µg/ml
A. niger	5.85±0.23*	6.97±0.14**	17.61±0.30**	21.27±0.25**
A. flavus	6.17±0.14*	7.35±0.32**	18.42±0.62**	22.51±0.40**
E. Coli	6.70±0.27***	7.48±0.15**	19.30±0.72**	23.57±0.29**
S. epidermidis	6.28±0.13**	8.31±0.23***	20.19±0.33***	24.42±0.37**

Significance level denoted by.

*Values were expressed in Mean±SEM; found statistically significant at P<0.05, compared to control (n=6).

Table 2 Antibacterial role of *P. murex* methanolic leaves extract and Ciprofloxacin at 100µg/ml & 200µg/ml against *A. Niger, A. Flavus, E. Coli* & *S. epidermidis*

Strains	Zone of inhibition (mm)			
	P. Murex leaves extract		Ciprofloxacin	
	100µg/ml	200µg/ml	100µg/ml	200µg/ml
A. niger	10.38±0.33**	13.27±0.29**	18.01±0.24**	21.04±0.28**
A. flavus	11.32±0.43*	14.62±0.43**	19.34±0.57**	22.54±0.37**
E. Coli	11.59±0.54**	14.27±0.22**	20.27±0.29***	23.92±0.64**
S.epidermidis	12.32±0.29***	15.98±0.58**	21.26±0.13**	21.65±0.20**

Significance level denoted by.

*Values were expressed in Mean±SEM; found statistically significant at P<0.05, compared to control (n=6).

According to earlier research, the various levels of sensitivity of the pathogens investigated may be related to the microorganism's inherent tolerance as well as the kind and quantity of phytochemicals contained in the crude extract. The gram-negative bacterium has a multi-layered cell wall in contrast to the gram-positive bacteria, which has a single layer of cell wall. The passage of the active substance through the gram-negative cell wall is also the cause of the variable inhibition zone. *Pedalium murex* underwent additional testing for the study since it shown antibacterial efficacy against all strains of bacteria examined. Leaves extract of *P. murex* demonstrated a remarkable antibacterial action. It resembles to standard group in their efficacy. In disc diffusion method, antibacterial potential was found maximum against *S. epidermidis*.

It might be effective in controlling the growth and development of vegetative forms of bacteria thus exhibit bacteriostatic and bactericidal properties.

Conclusion

It concludes that leaves of *P. murex* are effective in the prevention of bacterial growth & infection. This research unfolds the antibacterial potential of *P. murex* leaves by using diverse scientific protocols. It suggests, recognizing and isolating the responsible moieties responsible for this pharmacological action and dosage forms to be developed as well.

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None.

Conflicts of interest

Authors declared for none conflict of interest.

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