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ANTIMICROBIAL ACTIVITIES OF PEDALIUM MUREX LINN ON MICROBIAL PATHOGENS

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ABSTRACT

The antimicrobial effect of ethanolic and aqueous extract of dried fruits of Pedalium murex Linn on bacteria, Bacillus subtilis and fungi, Aspergillus niger were determined using cup and plate method. The ethanolic extract of Pedalium murex Linn gave the wider zone of inhibition (1.5cm) in comparison with Standard drug, streptomycin (1.7 cm) against Bacillus subtilis. While inhibition zone (1.3 cm) was recorded for the same organism with aqueous extract compared with Standard drug (1.4 cm). Similarly, the growth of Aspergillus niger was inhibited significantly by ethanolic extract while the aqueous extract was the least effective. The minimum inhibitory concentration (MIC) for the ethanolic extract was 20.0 and 40.0 mg/ml for both bacteria and fungi. This study revealed that the ethanolic extracts showed strong inhibitory effect on the test organisms than aqueous. The results therefore concluded a good support for the use of Pedalium murex Linn in folk lore traditional medicine.

KEYWORDS: Pedalium murex Linn, Streptomycin, Bacillus subtilis and Aspergillus niger, Antifungal, Antibacterial.

INTRODUCTION

Pedalium murex Linn is a member of the family Pedaliaceae; it is widely distributed in Sea coastal region of India and some parts of Africa. It is a succulent herb about 15 to 40 cm in height. It mainly consist of flavonoids, alkaloids, gum resins and amino acids. Diosgenin is one of important constituent. It is used as antihiperlipidemic, anti arthritic and in gonorrheal rheumatism, as analgesic and anti-inflammatory and also be used locally in apthae. It has high value in the treatment of lithiasis. Traditional doctors in India have claimed to have successfully used the plant to cure many diseases. However, antimicrobial activities of Pedalium murex Linn have not been properly documented. In this report, we provide new information on the antimicrobial activities of P. murex using known microbial pathogens as test organisms.

MATERIALS AND METHODS

Collection and Selection of Plant Samples

The dried fruits of Pedalium murex Linn were collected in the month of November 2009 from Green Pharmacy Garden, Pune, MS, India. It was compared with standard botanical description available with us and the plant material identification, authentication and specimen referencing was done under the guideline of a Botanist. A voucher specimen (TTS PM-23) has been kept in our college museum for future reference. The samples were stored in air tight containers for further analysis.

Test Organisms

Two microorganisms used in this study as test organisms comprising of clinical isolates of bacteria Bacillus subtilis and fungi Aspergillus niger were obtained from the Microbiology Department of JSPMs Charak College of Pharmacy and Research, Wagholi, Pune. MS. India. The typed cultures of bacteria and fungi were sub-cultured on Nutrient agar and Saboraud dextrose agar slants respectively and stored at 4°C until required for study.

Extraction of Plant

About 300 g of the dried fruits were ground to fine powder using Laboratory Hammer mill. The powdered material of Pedalium murex Linn was extracted separately by continuous hot extraction process using soxhlet apparatus with ethanol (90%) and aqueous.
Bacillus subtilis showed that ethanol was the best solvent for extracting various extracts of microorganisms. The inhibitory concentration (MIC) of the test organisms was recorded as the minimum concentration of the extracts that inhibited the growth of the test organisms. Incubated all the plates in incubator for 24-48 hours at 37°C. The zones of inhibition were measured and recorded.

Minimum Inhibitory Concentration
Different concentrations of the dried fruits of Pedalium murex Linn were prepared to obtain 20 mg/ml, and 40 mg/ml. Two-three drops of overnight broth culture of the test organisms were inoculated into the dilutions and incubated at 37°C for 24 hours. The lowest concentration of the extracts that inhibited the growth of the test organisms was recorded as the minimum inhibitory concentration (MIC).

RESULTS AND DISCUSSION
The results obtained showed that dried fruits of Pedalium murex Linn have bactericidal effects on pathogenic microorganisms. Based on the ethno pharmacology literatures, various extracts P.murex Linn were screened for its anti-microbial activity against Bacillus subtilis and Aspergillus niger using cup and plate method. Table 1 showed that ethanol was the best solvent for extracting antimicrobial substances from this plant than water. The aqueous and ethanolic extract of standard drug showed 1.2 cm and 1.4 cm zone of inhibition respectively against Bacillus subtilis whereas the aqueous and ethanolic extract of Pedalium murex Linn showed 1.1 cm and 1.2 cm respectively. Similarly against Aspergillus species, aqueous and ethanolic extract of standard drug showed 0.9 cm and 1.3 cm zone of inhibition respectively whereas the aqueous and ethanolic extract of Pedalium murex Linn showed 1.0 cm and 1.1 cm respectively. Thus, aqueous and ethanolic extract of Pedalium murex Linn showed moderate antimicrobial activity as compared to standard drug, Streptomycin in table no.1.

ACKNOWLEDGEMENT
Authors are thankful to the management, Jspms Charak College of Pharmacy and Research, Wagholi, Pune for providing the laboratory facilities to carry out the work.

REFERENCES
### Table 1: Antibacterial and antifungal Properties of *Pedalium murex* Linn using Cup and plate Method

<table>
<thead>
<tr>
<th>Species</th>
<th>Extracts</th>
<th>Conc (mg/ml)</th>
<th>Standard</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em></td>
<td>Aqueous</td>
<td>20</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Ethanol</td>
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<td>1.0</td>
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<td></td>
<td></td>
<td>40</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td><em>Aspergillus niger</em></td>
<td>Aqueous</td>
<td>20</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>1.0</td>
<td>1.2</td>
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<td></td>
<td></td>
<td>40</td>
<td>1.6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Standard Drug:** Streptomycin. **Test drug:** *Pedalium murex* Linn Extracts  
**Test Organisms:** *Bacillus subtilis* and *Aspergillus niger*

### Anti-Microbial Activity

#### Anti-bacterial Activity

- **Fig.1 (a)** Anti-bacterial activity of Streptomycin.
- **Fig.1 (b)** Anti-bacterial activity of Aqueous extract.
- **Fig.1 (c)** Anti-bacterial activity of Ethanol extract.

#### Anti-fungal Activity

- **Fig.2 (a)** Anti-fungal activity of Streptomycin.
- **Fig.2 (b)** Anti-fungal activity of Aqueous extract.
- **Fig.2 (c)** Anti-fungal activity of Ethanol extract.

**Figure: 1.** (a, b, and c).
Kinetics of antimicrobial activities of a) streptomycin, b) ethanol and c) aqueous extracts of *Pedalium murex* Linn against *Bacillus subtilis*.

**Figure: 2.** (a, b, and c).
Kinetics of antimicrobial activities of a) streptomycin, b) ethanol and c) aqueous extracts of *Pedalium murex* Linn against *Aspergillus niger*.

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