Antibacterial Activity of Marsilea Quadrifolia Linn.

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Abstract

‘Four Leaf Clover’ or aalaik keerai in Tamil is in use for more than 3000 years as part of food. It is a pteridophytic plant that is marketed and used by tribals of Eastern India as a nerve relaxant and curative agent due to its nutritional value. In the present study M. quadrifolia leaf extracts have showed effective inhibition against gram negative bacteria such as Salmonella typhi, Pseudomonas fluorescens, Pseudomonas aeruginosa and Escherichia coli. These results are in accordance with the previous results were M. quadrifolia revealed profound antibacterial, cytotoxic and antioxidant effects. Despite these uses, no published works are available for the antimicrobial property of this plant. The study was therefore aimed to investigate the antibacterial effects of ethanolic extract of the experimental plant, the pathogens were tested by disc diffusion assay method and minimum inhibitory concentration was evaluated. An attempt has been made to compare the activity of extract with standard ciprofloxin.

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Key words: Antibacterial, Escherichia coli, four leaf clover, Marsilea, Salmonella.

Materials and Methods

Collection and extraction of plant materials

Fresh plant was collected from Chennai and identified with the help of botanist of RRIUM, Chennai. 250g air-dried powder was subjected to 250ml of ethanol in soxhlet extraction for 8 hours (50–85°C). The extract was concentrated to dryness in a flask evaporator under reduced pressure and controlled temperature (50–60°C) to yield crude residue, which was then stored in refrigerator. The extracts were filtered through Whatman No. 1 filter paper and then concentrated in a vacuum at 40°C using a rotary evaporator. Each extract was transferred to glass vials and kept at 4°C before use.

Testing of Antibacterial activity

In vitro antimicrobial activity was examined for the ethanolic extracts of leaf of plant against four bacterial species, the gram negative strains Salmonella typhi (ATCC 00215), Pseudomonas fluorescens (ATCC 06341), Pseudomonas aeruginosa (ATCC 02150) and Escherichia coli (ATCC 10263).

Disc Diffusion Method

The testing of antibacterial activity of the plant extracts was
TABLE 1. ANTIMICROBIAL ACTIVITY OF MARSILEA QUADRIFOLIA Linn LEAF.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Zone of inhibition (in mm)</th>
<th>Ciprofloxacin (50μg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100μg/ml</td>
<td>150μg/ml</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td>8±0.1</td>
<td>11±0.1</td>
</tr>
<tr>
<td>Pseudomonas fluorescens</td>
<td>10±0.2</td>
<td>17±0.1</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>11±0.1</td>
<td>15±0.2</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>7±0.1</td>
<td>13±0.1</td>
</tr>
</tbody>
</table>

activity was seen in case of Pseudomonas fluorescens where the zone diameter was 32 mm (300μg/ml).

The minimum inhibitory concentration study revealed that the value for the bacteria Salmonella typhi and Escherichia coli as 80 μg/ml and 60 μg/ml for Pseudomonas fluorescens and Pseudomonas aeruginosa. This invitro study demonstrated that folk medicine can be as effective as modern medicine to combat pathogenic microorganisms. This study serves as a baseline in identification of new medicinal plant and further investigation on the same may yield new compounds of medicinal importance for specific microbial disease. It has been observed that pteridophytes are not infected by microbial pathogens which may be one of the important factors for the evolutionary success of pteridophytes and the fact that they survived for more than 350 million years [7]. The Ayurvedic and unani systems of medicine recommended the medicinal use of the pteridophytes [8]. M. quadrifolia has got profound antibacterial, cytotoxic and antioxidant effect and may have potential use in medicine [9]. It showed bioactivity properties such as anti-inflammatory, anti tussive, antitumor, but a very little research has been carried out on the evaluation of bioactive properties of pteridophytes. Hence an attempt has been made to evaluate the antimicrobial properties of this fern.

References

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