ABSTRACT

**Objective:** *Opuntia ficus indica* is a medicinal plant belonging to family Cactaceae. It is a species of cactus that has long been a domesticated crop plant important in agricultural economies throughout arid and semi-arid parts of the world. The fruit and stem are used to prepare worth added products, fruits jam, squash, drinks, preserve product of pickle, body lotion, shampoo and creams, etc.

**Methods:** For the preliminary study, various extracts of stem and fruit have been used to check the efficacy of antibacterial activity against *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Escherichia coli* bacteria of gram-positive and gram-negative strain respectively using disc diffusion method.

**Results:** The stem and fruit extracts showed various levels of activity on different test organisms. The methanol fruit extracts showed high antibacterial activity against *Escherichia Coli, Pseudomonas aeruginosa* and *Bacillus subtilis* compared with other extracts. Aqueous extract of stem and fruit showed less antibacterial activity against the tested bacterial strains.

**Conclusion:** The present study suggests that the methanol extracts of the fruit of *Opuntia ficus indica* contain compounds that can form the basis for the development of a novel broad-spectrum antibacterial formulation.

**Keywords:** *Opuntia ficus indica*, Antibacterial activity, Methanol extract, Ethanol extract, Aqueous extract

INTRODUCTION

The use of plants for treating diseases is as old as the human species. Popular observations on the use and efficacy of medicinal plants significantly contribute to the disclosure of their therapeutic properties, so that they are frequently prescribed, even if their chemical constituents are not always completely known. Medicinal plants represent a rich source of antimicrobial agents. *Opuntia ficus-indica* is a species of cactus that has long been a domesticated crop plant important in agricultural economies throughout arid and semi-arid parts of the world. Cactus is a tropical and subtropical plant. It is a member of the Cactaceae [2] family. Prickly pear is widely distributed in many countries such as Mexico, America and Africa [8]. Prickly pear is in mature stage up to 2 m long, with plump, even, rounded segments, armed with spines called pads. The fruits are yellow and orange color; barrel or egg shaped and up to 10 cm long.

Preparation of plant extracts

The *Opuntia ficus indica* stem and fruit were collected and washed in distilled water. They were then dried in small pieces, and air dried. The dried stem and fruits were ground using a mixer into a fine powder and were placed on it. The inoculated plates were then incubated at 37 °C for 24 hours [11]. The diameter of the zone of inhibition formed around the paper disc was measured and expressed in mm.

**MATERIALS AND METHODS**

**Plant material**

*Opuntia ficus indica* stem and fruit were collected from the area of Jayankondam in Ariyalur district, Tamilnadu, India.

**Test organisms**

The strains of *B. subtilis*, *P. aeruginosa* and *E. coli* were obtained from Department of Microbiology, Annamalai University, Chidambaram, and Tamilnadu, India.

**Extractions**

5 gm of the dried plant material was soaked in 15 ml of solvents separately (aqueous, ethanol, and methanol) and left for 5 d. The fraction was separated using muslin cloth and filter through whatman filter paper No.1 and the crude extracts were stored in a refrigerator at 4 °C. All the extracts were then concentrated in a rotary vacuum evaporator at 4 °C.

**Disc diffusion method**

Antibacterial activities of stem and fruit extracts were tested using disc diffusion method [9]. 0.1 ml of the test bacterial culture were aseptically inoculated by spreading them evenly into the surface of nutrient agar plates. A 6 mm diameter discs were impregnated with stem and fruit extracts at different concentrations (50μ, 100μ and 150μ) individually and were placed on it. The inoculated plates were then incubated at 37 °C for 24 hours [11]. The diameter of the zone of inhibition formed around the paper disc was measured and expressed in mm.
Statistical analysis

Each experiment was performed in triplicate. The results were expressed as the mean±SD. The statistical analyses were performed using SPSS 11.0 software package. Statistical variances were assessed using ANOVA. Significant differences (p<0.05) between the means were identified by Duncan’s Multiple Range Test (DMRT).

Table 1: Antibacterial activity of stem extracts of Opuntia ficus indica

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Bacillus subtilis</th>
<th>Pseudomonas aeruginosa</th>
<th>Escherichia coli</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C 50 µl 100 µl 150 µl</td>
<td>50 µl 100 µl 150 µl</td>
<td>50 µl 100 µl 150 µl</td>
</tr>
<tr>
<td>Ethanol</td>
<td>8.3±0.10 14.6±0.32</td>
<td>8.4±0.32 20.5±0.40</td>
<td>8.7±0.25 17.5±0.41</td>
</tr>
<tr>
<td>Methanol</td>
<td>5.6±0.57 6.1±0.17</td>
<td>6.0±0.05 6.5±0.23</td>
<td>6.6±0.20 6.1±1.08</td>
</tr>
<tr>
<td>Aqueous</td>
<td>6.1±0.17 6.4±0.05</td>
<td>6.2±0.2 6.4±0.11</td>
<td>6.7±0.05 6.4±0.32</td>
</tr>
</tbody>
</table>

Table 2: Antibacterial activity of fruit extracts of Opuntia ficus indica

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Bacillus subtilis</th>
<th>Pseudomonas aeruginosa</th>
<th>Escherichia coli</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C 50 µl 100 µl 150 µl</td>
<td>50 µl 100 µl 150 µl</td>
<td>50 µl 100 µl 150 µl</td>
</tr>
<tr>
<td>Ethanol</td>
<td>8.3±0.10 14.6±0.32</td>
<td>8.4±0.32 20.5±0.40</td>
<td>8.7±0.25 17.5±0.41</td>
</tr>
<tr>
<td>Methanol</td>
<td>5.6±0.57 6.1±0.17</td>
<td>6.0±0.05 6.5±0.23</td>
<td>6.6±0.20 6.1±1.08</td>
</tr>
<tr>
<td>Aqueous</td>
<td>6.1±0.17 6.4±0.05</td>
<td>6.2±0.2 6.4±0.11</td>
<td>6.7±0.05 6.4±0.32</td>
</tr>
</tbody>
</table>

C—Control, (-)-No activity, mm—Millimeter, Data given are mean of three replicates±standard deviation

REFERENCES