Antibacterial and Antifungal Potentiality of Root Extract of Boerhavia verticillata Poir: An Ethno medicinal Plant

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Abstract- Boerhavia verticillata Poir is medicinally active plant which the tribal people use to cure various diseases like renal disorder, odema, skin rashes. The roots of these herb is diuretic, is highly effective in cases of chronic pyelonephritis, odema (water retention) and urinary tract infections (U.T.I.) in animals and humans. Methanolic and Acetone extracts of the plant root were evaluated against four clinically important bacterial strains such as E.coli, B.cereus, B.subtilis, S. typhiA by disc diffusion method.

Keywords: Infections, botany, antimicrobial, adaptogenic

I. INTRODUCTION
India has rich heritage of using medicinal plants in traditional medicines. Although hundred of plant species have been tested for antimicrobial properties (Nazia Massod Ahmed and Perween Tariq, 2008; Arunkumar and Muthuselvam., 2009; Velu. and Bhaskaran., 2012; Selvamohanet al., 2012; Vedhanarayananet al., 2001; Mehta et al., 2014), there is no report on antimicrobial properties of various plants parts like leaves, fruit, root of Boerhavia verticillata Poir against the bacterial microorganisms. The present study is aimed to carry out the preliminary phytochemical analysis and to screen in vitro antimicrobial activity of the root extract against four clinically important bacterial strains by using agar disc diffusion method.

II. MATERIAL AND METHODS
The whole plant of Boerhavia verticillata Poir was collected from campus of Gujarat University; Navrangpura, Ahmedabad. The plant is perennial having the length of 20-50 cm. It produces white colored and have long peduncled raceme arranged flowers. There is a crown of five glands structure on the fruits. The seeds are perispermous (N.C. Nair and V. J. Nair,)

Fig 1 Boerhavia verticillata Poir shoot part

2.1 Extraction of plant roots
The roots were separated from the whole plant. The extraction of roots was done by methanol and acetone by using Soxhlet apparatus. The solvent was evaporated by using rotary evaporator at 80° temperature and the extract obtained was cooled and dried under vacuum.

2.2 Bacterial strains used:
Microbial strains Escherichia coli, Bacillus cereus, Bacillus subtilis, Staphylococcus aureus, Salmonella typhi, Salmonella typhiA, were obtained from MUIS, Ganpat university, Mehsana and M. G. Science Institute, Ahmedabad (Gujarat).
III. ANTIMICROBIAL ASSAY FOR DISC DIFFUSION METHOD

Antimicrobial assay of solvent extracts were performed by Disc diffusion method. For bacteria Nutrient broth and pH was adjusted to 7.2 and 7.0 respectively with 5 M sodium hydroxide. Bacteria species were swab separately on the Nutrient agar plate aseptically. The sterile disc, 5mm in diameter, is saturated at concentration of 10 µl/10ml test culture methanol extract and acetone extract. Disc with absolute methanol and acetone is used as a control. The bacterial plates were incubated at 37°C for 24 hr while fungal plates were incubated at 28°C for 24-48 hr. The sterile impregnated disc with plant extract were placed on the agar surface with flamed forceps and gently pressed down to ensure complete contact of the disc with the agar surface. Antibacterial and antifungal activity was determined by measuring the diameter of the zone of inhibition surrounding microbial growth. For each strain, controls were included that comprised pure solvents instead of the extract (Parekh and Chanda, 2007). Zone of diameter was showing no growth of the given organism has been reported as MIC of the test culture against Bacteria.

The in vitro antibacterial activities of methanol and acetone extracts of roots of *Boerhavia verticillata* Poir in terms of zone of inhibition according to concentration was presented in table IV.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Methanol</th>
<th>Acetone</th>
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<tbody>
<tr>
<td></td>
<td>Concentrations</td>
<td>10µl/mg</td>
</tr>
<tr>
<td>1.</td>
<td>Control for <em>Escherichia coli</em></td>
<td>11mm</td>
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<tr>
<td></td>
<td>Escherichia coli</td>
<td>11mm</td>
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<tr>
<td>2.</td>
<td>Control for <em>Bacillus cereus</em></td>
<td>+</td>
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<tr>
<td></td>
<td><em>Bacillus cereus</em></td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>Control for <em>Bacillus subtilis</em></td>
<td>13mm</td>
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<tr>
<td></td>
<td><em>Bacillus subtilis</em></td>
<td>33mm</td>
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<tr>
<td>4.</td>
<td>Control for <em>Salmonella Typhi</em></td>
<td>20mm</td>
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<td></td>
<td><em>Salmonella Typhi</em></td>
<td>12mm</td>
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</tbody>
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IV. DISCUSSION

The medicinal properties of plants are due to the presence of different complex chemical substances as secondary metabolites, which are exclusively accumulated in different parts of the plants and produce marked healing action on human body (Bashir et al., 2012). Plant based antibacterial compounds have enormous therapeutical potential as they can serve the purpose without side effects that are often associated with synthetic antimicrobials (Sukanya et al., 2009). The test organisms used in the study are associated with various forms of human infections. The test organisms used in the study are associated with various forms of human infections. Apart from *Salmonella typhimurium*, *Salmonella paratyphi A and B also widely persist in Indian population (Prasanna Balaj et al., 2012). In the present study acetone root extract *Boerhavia verticillata* of concentration 50 µl/ml and 60µl/ml showed 24mm and 25mm zone of inhibition against *Salmonella typhi*. This reveals that methanolic extract of root *Boerhavia*
verticillata Poir showed considerable less inhibitory activity comparing to acetone root extract of Boerhavia verticillata

E. coli causes septicemias and can infect the gall bladder, meninges, surgical wounds, skin lesions and the lungs, especially in debilitate and immunodeficient patients (Doughari et al., 2008) From the results of present investigation it is reported that root extract prepared in Acetone shows significant higher antimicrobial activity against all test microorganisms revealing inhibition zones between 15 mm and 40 mm as compared to that reported in methanol root extract (inhibition zone ranges between11mm and 16 mm) indicating that the antimicrobial activities also vary with the solvents used. This tends to show that active ingredients of the root are better extracted with Acetone than methanol. The present study ascertain the value of solvents used in the drug preparation, which could be of considerable interest to the development of new drugs. The fact that the root extract of Boerhavia verticillata Poir was active against all the tested microorganisms is also an indication that it can be a source of very potent antibiotic substances that can be used against drug resistant microorganisms. As there is no report on antimicrobial activity of root extract of Boerhavia verticillata Poir further studies are needed to isolate and characterize the bioactive principles to develop new antimicrobial drugs.

V. REFERENCES


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