1 INTRODUCTION

Antibiotic Susceptibility Test (ABST) is usually carried out to establish which antibiotic will be most successful in treating a bacterial infection\(^\text{(1)}\). The MIC or minimum inhibitory concentration is the lowest concentration (in \(\mu g/ml\)) of antibiotic that inhibits the growth of a given strain of bacteria\(^\text{(2)}\). MIC helps to determine which class of antibiotic is more effective and the organisms are inhibited only by the maximum recommended concentration. Here we use plant extract for the testing of ABST and MIC against the pathogens. The plant extracts are stored in an active form by using immobilization technique. This technique is used for physical or chemical fixation of cells, enzymes or other proteins on to a solid support, it protects the enzymes from degradation and deactivation by trapping, encrypting, encapsulating the enzymes in a matrix. Or membrane which can be reused again for the future purpose. Medicinal plants, also called as medicinal herbs have been discovered and used in traditional medicine practices since pre-historic times\(^\text{(3-6)}\). Plants synthesis chemical compounds which defense against microbes and diseases. Many of these plants extracts produce the active secondary metabolites like phenolic compounds, alkaloids, flavonoids, terpenoids, peptides, etc. Basil (Ocimum tenuiflorum), commonly known as holy basil leaves (Ocimum tenuiflorum), Aloe vera (Aloe barbadensis miller), karpuravalli (Plectranthus amboinicus), kuppaimani (Acalypha indica) to determine an antimicrobial activity. By using different concentrations of these extracts, we evaluate whether the bacteria are susceptible to these compounds or not.

We use Gram positive and Gram-negative microorganisms for the evaluation of pharmacological examinations and furthermore we have used immobilization technique for long term preservation. This technique will be useful to keep the medicinal plant extracts in an active form for a longer period of time.

Keywords: Medicinal plant extracts, gram positive and gram-negative microorganisms, immobilization technique.

2 PROCEDURE

2.1 Materials and Methods

Bacterial culture
To assess the antibacterial activity the plant concentrates were researched using strain of microorganisms Streptococcus aureus (gram positive microscopic organisms), Escherichia coli (gram negative microbes). The composed societies of microscopic organisms were sub-refined on Nutrient agar and put away at 4°C until required for study\(^\text{(11)}\).

Agar Disc Diffusion Assay
The vulnerability of all anti-infection agents was completed by utilizing circle dissemination strategy on Muller-Hinton agar or Nutrient agar. S. aureus and E. coli were become medium-term on supplement stock and spread over the media plate were anti-microbial disc (plant concentrate) was moved aseptically on media plate\(^\text{(12)}\).

Well Diffusion Assay
A distance across of 6-8mm is punched aseptically with a sterile gel puncher and the diverse convergence of the plant extract arrangement is brought into the well\(^\text{(7)}\).

Minimal Inhibitory Concentration
The MIC is the most minimal grouping of antimicrobial operator that totally restrains the development of the small-scale creature in miniaturized scale weakening wells and plate using various convergences of plant extracts that can be recognized by the naked eye\(^\text{(10)}\).

Collection of Plant Materials
The leaves of Ocimum tenuiflorum, Aloe barbadensis miller, Plectranthus amboinicus, and Acalypha indica were gathered in the various places of Vellore (Ponnai, Ranipet, Katpadi, Kilambadi village, Thengal village). Test samples were homogenized and collected into sterile Eppendorf tubes.
2.3 Figures

![Figure 1: Shows the culinary plants used for the antimicrobial test.](image)

**Figure 1:** Shows the culinary plants used for the antimicrobial test.

**Plant Extracts**

Plants were surface disinfected with distilled water and homogenize with ethanol utilizing mortar and pestle. The concentrate is moved into sterile Eppendorf tubes in various concentrations (µg/ml).

**Preparation of Plant Extracts**

Fresh plant leaves of O. tenuiflorum, A. barbadensis miller, P. ambionicus, and A. indica are gathered and surface sterilized with distilled water and homogenize with ethanol utilizing mortar and pestle. The plant concentrates were moved in to sterile Eppendorf tubes.

![Figure 2: Shows the plants extracts](image)

**Figure 2:** Shows the plants extracts

**Immobilization of Plant Extracts**

4% of cacl2 (4g in 100ml dis.H2O) is arranged and put away in 4°C for 4 hours.

Sodium alginate: 0.685g of sodium chloride in 100ml of distilled water is taken. In that 3.5 g of sodium alginate is gradually included and mixed in a magnetic stirrer and kept at room temperature for 4 hours.

20 ml sodium alginate is taken in four unique measuring beakers and add 2ml of plant extracts and mix it well.

20ml calcium chloride (kept in refrigerator at 4°C) is taken in 4 distinctive glass containers. At that point sodium alginate with the extracts is dropped in to cacl2 by utilizing a dropper or syringe to make beads.

The beads were separated and break down in PBS (Phosphate buffer solution) for conservation.

Aloe barbadensismiller (aloe vera) beads and Acalypha indica (kuppaimen)beads

Plectranthus amboinicus (karpuravalli) O.tenuiflouroum(basil) beads
RESULTS

The extracts from Ocimum tenuiflorum, Aloe barbadensis miller, Plectranthus amboinicus and Acalypha indica are tested for the antimicrobial activity against the microorganisms like E.coli and S.aureus using well diffusion and disc diffusion method. The extracts from all these four culinary plants shows the zone of inhibition in both the methods, the extracts from Plectranthus amboinicus, Acalypha indica shows the highest activities against those microbes in disc and less in well. Among the two microbes S.aureus shows the more susceptibility to the plant extracts, E.coli shows the less susceptibility which is given below in Table 1. E.coli is multi resistant bacteria to all the drugs but it shows less susceptibility to Ocimum tenuiflorum and A.barbadensis miller. In this test it seems that S.aureus shows the high susceptibility against the antimicrobial extracts used. E.coli does not show that much inhibitory against antimicrobial extracts used for the test. MIC was done for the microbes which has shown the highest inhibitory concentration against the antimicrobial extracts. Among the plant extracts tested Plectranthus amboinicus, Acalypha indica shows the highest activities against those microbes in disc and less in well. The extracts from Ocimum tenuiflorum, Aloe barbadensis miller, Plectranthus amboinicus and Acalypha indica shows the strong antimicrobial activity.

Table 1and Table 2 shows that the concentration of leaf extracts used and the measurements of the inhibition zones and the type of test organisms used.

### Table 1: Shows the measurements of inhibition zones in disc diffusion method

<table>
<thead>
<tr>
<th>S.No</th>
<th>Leaf extract</th>
<th>Concentration of extracts (µg/ml)</th>
<th>In Escherichia coli</th>
<th>In Staphylococcus aureus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ocimum tenuiflorum</td>
<td>0.2cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Aloe barbadensis miller</td>
<td>0.2cm</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Acalypha indica</td>
<td>0.2cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Plectranthus amboinicus</td>
<td>0.2cm</td>
<td>1.5</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 2: Shows the measurements of inhibition zones in well diffusion method

<table>
<thead>
<tr>
<th>S.No</th>
<th>Leaf extract</th>
<th>Concentration of extracts (µg/ml)</th>
<th>In Escherichia coli</th>
<th>In Staphylococcus aureus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ocimum tenuiflorum</td>
<td>0.1cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Aloe barbadensis miller</td>
<td>0.1cm</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Acalypha indica</td>
<td>0.3cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Plectranthus amboinicus</td>
<td>0.3cm</td>
<td>1.5</td>
<td>2</td>
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</tbody>
</table>

### Table 3: Measurements of inhibition zones in immobilized bead extracts

<table>
<thead>
<tr>
<th>S.No</th>
<th>Immobilized bead extract</th>
<th>Concentration of extracts (µg/ml)</th>
<th>In Escherichia coli</th>
<th>In Staphylococcus aureus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ocimum tenuiflorum</td>
<td>0.1cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Aloe barbadensis miller</td>
<td>0.1cm</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Acalypha indica</td>
<td>0.3cm</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Plectranthus amboinicus</td>
<td>0.3cm</td>
<td>1.5</td>
<td>2</td>
</tr>
</tbody>
</table>

DISCUSSION

Come to know that the effectiveness of the culinary plants extracts which is assessed against the microbes using ABST and MIC, because the antimicrobial drugs are increased nowadays due to the potential of the microbes. There are many medicinal plants which is used to treat many diseases and established as the antibiotics. The MIC was done to the bacteria which shows the highest susceptibility of the antimicrobial extracts.

CONCLUSION

Four of the plant tried here Ocimum tenuiflorum (basil), Acalypha indica (Kuppaimeni), Plectranthus amboinicus and Aloe barbadensis miller shows the strong antimicrobial activity.
(karpuravalli) and Aloe barbadensis miller displayed antimicrobial action. It gives the logical bases to the uses of these plant extracts in homemade cures and their potential applications against microorganism.

ACKNOWLEDGEMENT
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REFERENCE