STUDY OF ACTIVITY OF SOME ETHNOMEDICINAL PLANTS OF WEST BENGAL, INDIA.

Dr. Samir Kumar Pal*

Asst. Professor, Department of Botany, Krishnagar Govt. College, W.B, India.

ABSTRACT

The present aim is to study of some ethnomedicinal plants having antimicrobial activity and commonly found around the area in different districts of West Bengal, India. Common ethnomedicinal plants from several areas of different districts are collected and tested against Gram +ve and Gram –ve bacteria for their antimicrobial activity. Collected plant materials are dried and the soluble extracts are made using organic solvent like ethanol, methanol and acetone. Antimicrobial activities are measured using agar disc diffusion method. Greater the area of inhibition zone indicates the presence of good potentiality of antimicrobial activity. Antimicrobial activity of three plant parts like frond extracts of *Eupatorium odoratum*, *Artemisia dubia* and *Bergenia ciliata* are tested. Frond extracts of these species show good antimicrobial activity.

KEYWORDS: Antimicrobial, frond, extract, gram(+)ve and gram(-)ve.

INTRODUCTION

India is a land of its own diversity in flora with a rich of natural resources representing the natural biological heritage and inhabited by a large number of tribals with over 53 million tribals belonging to over 550 tribal communities(Ministry of Environment and forest, Govt. of India. 1994). They use a large number of ethnomedicinal plants for the treatment of various ailment of their own as well as their domestic animals. Information about ethnomedicinal plants come down traditionally through generation after generation. This original traditional knowledge of ethnomedicinal plants provides the good source of modern medicines as well as in ayurvedic and folk medicines.
Tribals use the phytoresources from their surrounding in various purposes. They provide the good knowledge regarding the various usage of wild plants available at their surroundings. Some ethnomedicinal plants have a good medicinal potential and need more pharmalogical study.

In West Bengal of India, a large number of tribals are inhabitting and they use folk medicines to cure their ailments. They provide a good traditional knowledge regarding the use of folk medicine of different districts of West Bengal, India having a rich biodiversity. Present aim is to study and gain knowledge of medicinal plants used by these tribals for treatment of their various ailments. For my present work three common plants such as *Eupatorium odoratum*, *Artemisia dubia* and *Bergenia ciliata* are collected based on the ethnomedicinal knowledge of tribals of different districts and tested against the antimicrobial activities. It needs to study the various parameters like climatic condition, plant parts for use, processing of materials having therapeutic activity as well as their chemical nature. The voucher specimens are verified from the specimens present in the herbarium of Central National Herbarium, Botanical Survey of India, Sibpur, Kolkata, West Bengal.

People of villages and tribal communities of West Bengal use folk medicine for their treatment of infectious diseases, wounds or burns directly as herbal medicines are more cheaper and more available to them. In some cases folk medicines are more effective than market medicine due to development of resistant pathogenic bacterial strain against the synthetic antibiotics.

Antimicrobial properties of many higher plant species and herbs have been reported by many authors.[1-10] The uses of herbal medicine to treat diverse ailments such as cough, malaria, wounds, toothache etc have been reported long and long ago traditionally among the various tribal communities and villagers.[11] Over last 20 years, a large number of secondary metabolites from different plant species have been evaluated for their antimicrobial activities.[12-25]

Due to indiscriminate use of antibiotics for treatment of infectious diseases, resistant pathogenic strains of bacteria are developed in a large number. As plant extract can exhibit antibacterial activities, scientists are interested to search for new antimicrobial substances from various plant extract. Present aim is to search plants that exhibit antibacterial activities under laboratory trial. The use of crude extracts of plant having antimicrobial properties has
great significance in the therapeutic treatment. World Health Organization (WHO) recommended that medicinal plants would be the best source of drugs.

It has been found that the plant extracts are effective against both Gram +ve and Gram –ve bacteria. Glands of superficial hairs on leaves and stem contain chemicals that are found to have antimicrobial Activity.[15]

MATERIAL AND METHODS

Fresh specimens of plants are collected from different places of different district of W.B in India. The specimens are then dried at 40$^\circ$C in Hot-air-oven for 3-5 days. The dried specimens are powdered. Frond extracts are made from powdered specimens in organic solvent acetone, methanol and ethanol. For each specimen and for each extraction 5 gm. powder is taken in three conical flasks (100ml) to which 20 ml solvent is poured respectively. The mouth of flasks are tightly plugged with non-absorbent cotton and sealed with grease to prevent evaporation. Then the flasks are placed in a shaker for about 24 hours at room temperature 37$^\circ$C. After shaking for 24 hours, the extracts are filtered using Whatman No-1 filter paper.

The filtered extracts are tested for antimicrobial activities against both Gram +ve and Gram –ve bacteria on nutrient agar plate by disc diffusion method (Bauer et al 1966).[26] The bacterium E.coli is taken as standard gram –ve specimen and the bacterium Bacillus megaterium is taken as standard gram +ve specimen for testing the antimicrobial activity.

In present experiment fresh bacterial culture solution having concentration 10$^6$ cells/ml is taken and discs of 6mm in diameter are made on nutrient agar plate for diffusion assay. Pure solvents are used as control. After incubation for 24 hours at 37$^0$ C, the diameter of inhibition zones are measured and analyzed. Three replicates are made for each set of experiment. Protein is determined by the method of Lowry et al (1951).[27]

RESULTS

The result of antibacterial activity of three selective plants Eupatorium odoratum, Artemisia dubia and Bergenia ciliata are shown in table No.1,2 and 3. The results show the well antimicrobial activity for both Gram( +ve) and Gram ( -ve) bacteria. The frond extracts of these three plants show good antibacterial activity. It indicates that the antibacterial substances present in frond are in good amount. The best antimicrobial activity is found in
mature leaf extracts of these species. Young leaf extracts also show antimicrobial activity but in lesser amount than mature leaf extracts.

In *Eupatorium odoratum*, highest antibacterial activity for Gram(+)ve bacteria is found in young leaf extract. Old leaf extract is less effective. A good antimicrobial activity against Gram (-)ve bacteria is also found in the mature leaf extract. Ethanol extract has little better effect than methanol extract. Though acetone can be used as solvent but either ethanol or methanol will be better solvent than acetone.

In *Artemisia dubia* highest antibacterial activity for both gram(-)ve and gram (+)bacteria is found in mature leaf extract. Old leaf extract is less effective. Young leaf extract also shows a good effective for both gram (-)ve and gram (+) bacteria. The activity of mature leaf extract against Gram(-)ve bacteria is better than Gram(+ve) bacteria. Among the solvents, methanol is better than either ethanol or acetone.

In *Bergenia ciliate* both mature and young leaf extracts are suitable for the source of antimicrobial substances. Among the solvents both methanol and ethanol extract have better effect than acetone extract. The solvent extract of methanol and ethanol are effective against both Gram(+ve) and Gram(-ve) bacteria but the highest activity for Gram(-)ve bacteria is found in mature leaf extract.

Old leaf extracts of all these three specimens are less effective against both Gram(+ve) and Gram(-ve) bacteria. The amount of proteins present in the extract shows little variation though antimicrobial activities show wide variation among the specimens. It indicates that proteins have little or no effect on antimicrobial activities.

### Table no.01. Antibacterial activity of *Eupatorium odoratum*.

<table>
<thead>
<tr>
<th>Name of the test organism</th>
<th>Young leaf</th>
<th>Mature leaf</th>
<th>Old leaf</th>
<th>Control(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>A (16.8)</td>
<td>M (22.2)</td>
<td>E (24.0)</td>
<td>A (15.5)</td>
</tr>
<tr>
<td></td>
<td>M (16.8)</td>
<td>E (20.2)</td>
<td>A (10.2)</td>
<td>M (14.5)</td>
</tr>
<tr>
<td></td>
<td>A (14.6)</td>
<td>E (6.4)</td>
<td>A (6.4)</td>
<td>E (6.4)</td>
</tr>
<tr>
<td><em>Bacillus megaterium</em></td>
<td>18.6</td>
<td>22.6</td>
<td>24.8</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>18.3</td>
<td>22.6</td>
<td>12.4</td>
<td>15.2</td>
</tr>
<tr>
<td></td>
<td>15.3</td>
<td>6.3</td>
<td>6.4</td>
<td>6.4</td>
</tr>
</tbody>
</table>
Table no.02. Antibacterial activity of *Artemisia dubia*

<table>
<thead>
<tr>
<th>Name of the test organism</th>
<th>Zone of inhibition (mm)</th>
<th>Young leaf</th>
<th>Mature leaf</th>
<th>Old leaf</th>
<th>Control(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td></td>
<td>A 12.6 M 14.5 E 12.5</td>
<td>A 16.2 M 20.2 E 15.6</td>
<td>A 10.2 M 12.0 E 10.6</td>
<td>A 6.4 M 6.3 E 6.2</td>
</tr>
<tr>
<td><em>Bacillus megaterium</em></td>
<td></td>
<td>14.2 M 18.8 E 15.5</td>
<td>18.5 M 22.2 E 19.3</td>
<td>12.5 M 16.4 E 14.4</td>
<td>6.3 M 6.3 E 6.3</td>
</tr>
</tbody>
</table>

Table no.03.Antibacterial activity *Bergenia ciliata*

<table>
<thead>
<tr>
<th>Name of the test organism</th>
<th>Zone of inhibition (mm)</th>
<th>Young leaf</th>
<th>Mature leaf</th>
<th>Old leaf</th>
<th>Control(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td></td>
<td>A 16.3 M 18.2 E 20.6</td>
<td>A 18.6 M 22.8 E 24.8</td>
<td>A 15.7 M 16.6 E 17.4</td>
<td>A 6.3 M 6.2 E 6.4</td>
</tr>
<tr>
<td><em>Bacillus megaterium</em></td>
<td></td>
<td>14.5 M 15.4 E 18.8</td>
<td>16.4 M 18.6 E 20.5</td>
<td>12.5 M 14.6 E 15.0</td>
<td>6.3 M 6.3 E 6.4</td>
</tr>
</tbody>
</table>

Table no 04: Study of pH value range of extracted samples.

<table>
<thead>
<tr>
<th>Name of the specimens</th>
<th>pH value of the extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young leaf</td>
</tr>
<tr>
<td><em>Eupatorium odoratum</em></td>
<td>6.6</td>
</tr>
<tr>
<td><em>Artemisia dubia</em></td>
<td>6.4</td>
</tr>
<tr>
<td><em>Bergenia ciliata</em></td>
<td>6.6</td>
</tr>
</tbody>
</table>

Table no. 05: Study of protein value of extracted samples

<table>
<thead>
<tr>
<th>Name of the specimens</th>
<th>Protein value of ethanol extracts(mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Young leaf</td>
</tr>
<tr>
<td><em>Eupatorium odoratum</em></td>
<td>0.058</td>
</tr>
<tr>
<td><em>Artemisia dubia</em></td>
<td>0.065</td>
</tr>
<tr>
<td><em>Bergenia ciliata</em></td>
<td>0.062</td>
</tr>
</tbody>
</table>

DISCUSSION

The leaf blades are covered by glands densely. These epidermal glands contain substances like phenolic compounds, glycosides, flavonoids and Alkaloids\(^{[28-33]}\). These substances are largely responsible for the antimicrobial activity and are being soluble in organic solvents easily extracted in methanol, ethanol and acetone but less soluble in water.\(^{[19]}\) The present results show the good antimicrobial activity of three species indicating the presence of good amount substances like phenolic compounds, glycosides, flavonoids and alkaloids. These observations are good agreement with the findings of Alade et al 1993\(^{[13]}\), Lai and Ray...
The antimicrobial activities of the plant extracts are also in agreement with the common usage of plants as in folk medicine for bacterial infection such as infection of throat, boil, ulcer and in wound healing, tumour, dermatophytes.\cite{11,37,38}

**CONCLUSION**

The antibiotic spectra of three plant extracts cover both gram positive and gram negative bacteria. These observations provide support that the plants produce a variety of antimicrobial substances. It is necessary to keep in mind that the factors like climatic condition, nature of plant parts, age of plant at the time of collection etc are also responsible for the enhancement of the activity of the antimicrobial substances and it needs to be studied more in details.

**ACKNOWLEDGEMENT**

The author is thankful to the principal of Krishnagar Govt. College for providing all laboratory facilities. The author is also thankful to the director of UGC(ER) for providing the financial assistance by granting a minor project.

**REFERENCES**


