SENSITIVITY PATTERN OF OPPORTUNISTIC BACTERIAL PATHOGENS OF HIV/AIDS PATIENTS ON CYCLEA PELTATA (LAM.) HOOK.F. & THOMSON - A POTENTIAL MEDICINAL PLANT.

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ABSTRACT

Objective: To examine the sensitivity pattern of Cyclea peltata (Lam.) Hook. f. & Thomson. (Malaitangi) against opportunistic bacterial pathogens isolated from HIV/AIDS patients of Namakkal district.

Methods: The fresh plant root were collected from Kolli Hills of Eastern Ghats, Tamil Nadu. The dry crude petroleum ether, chloroform, ethanol, methanol and acetone extracts of root of Cyclea peltata were used to examine the antibacterial activity using disc diffusion method. Results: All the extracts showed varying degree of inhibitory zones against all the tested bacteria. Ethanol root extract had higher inhibitory zones against Staphylococcus hominis, Staphylococcus aureus, Klebsiella oxytoca, Pseudomonas aeruginosa, Salmonella typhi, Proteus mirabilis and Serratia marcescens. Petroleum ether root extract showed maximum inhibition zone against Staphylococcus hominis and Klebsiella oxytoca. Conclusion: The present investigation showed the effectiveness of crude extracts of this plant against tested opportunistic bacterial pathogens. This study additionally suggested the use of Cyclea peltata root extract in treating diseases caused by tested opportunistic bacterial species.

KEYWORDS: Opportunistic pathogens, Cyclea peltata, Kolli hills, Antibacterial activity, Ethanol extract.

INTRODUCTION

Since prehistoric time, plant products have been used for the treatment of diseases and disorders. Plant in particular have been used to treat infectious diseases due to its
antimicrobial properties.\cite{1,2} Diseases due to pathogenic bacteria and fungi represent a critical problem to human health and they are one of the main causes of morbidity and mortality worldwide.\cite{3} Resistance to antibiotics and with the toxicity during prolonged treatment with present day drugs have been the reasons for an extended search for newer drugs to treat opportunistic microbial infections.\cite{4} Therefore, there are urgent needs to carry out a systematic scientific evaluation of the biological activity and to isolate and identify the bioactive agents in medicinal plants.

During this process, the investigation of the efficacy of plant based drugs in traditional medicine have been paid great attention because these drugs elicit few side effects, cheap and easily available; according to the World health organization 80% of the world population still relies mainly on plant drugs.\cite{5} Our fore fathers recommended some of the substances which are abundantly found in nature long before their value was demonstrated and understood by scientific methods. We should not dismiss any of our common heritage of knowledge unless and otherwise proved negative by the methods of scientific validation.\cite{6} Herbal medicines have good values in treating many diseases including infectious diseases, hypertension etc. That they can save lives of many, particularly in the developing countries, is undisputable.\cite{7} Herbal folk medicines provide an interesting and still largely unexplored source for drug development with potential chemotherapeutic benefits. We reported here our findings on some antibacterial effects of various organic extracts from roots of *Cyclea peltata* obtained by infusion and maceration against a wide range of opportunistic bacterial pathogens isolated from HIV/AIDS patients of Namakkal district.

**MATERIALS AND METHODS**

**Plant material**

The medicinal plant (Fig. 1) *Cyclea peltata* (Lam.) Hook. f. & Thomson. (Malaithangi) root was collected during September 2014 from the Kolli hills of Namakkal district. The plant was authenticated by Department of Botany, St. Joseph's College (Autonomous), Tiruchirappalli. Where a voucher specimen was deposited.
Extraction procedure

The plant material (root) was washed with water and shade dried at room temperature. The dried plant materials were ground into powder in an electric blender and subsequently sieved for obtaining fine powder. Fifty grams of the sieved powder was weighed accurately and subjected to extraction in a soxhlet apparatus at room temperature using acetone, methanol, ethanol, chloroform and petroleum ether successively.[8] At the end of 48 hrs each extract was filtered through Whatman No.1 filter paper and filtrates were concentrated at room temperature in order to reduce the volume. The paste like extracts were stored in pre-weighed screw cap bottles and the yield of extracts have been weighed. These screw cap bottles were kept in refrigerator at 4°C. Each of the extract was individually reconstituted using minimal amounts of the extracting solvent prior to use.

Test bacteria

A total of ten bacterial species were tested in the present study. The gram positive species were Staphylococcus hominis, Staphylococcus aureus and Enterococcus faecalis and gram negative species were Klebsiella pneumoniae, Klebsiella oxytoca, Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi, Proteus mirabilis and Serratia marcescens. The species that were not purchased were originally opportunistic pathogens isolated from clinical cases of suspected symptomatic HIV/AIDS patients of Namakkal district of Tamil Nadu. All the strains were confirmed by cultural and bio chemical characteristics and maintained in slants for further use.

Antibacterial activity procedure

Sterile liquid Muller Hinton Agar medium (pH 7.4 ± 2) was poured (10 -15 ml) into each sterile petriplates. After solidification, 100 µl of suspension containing $10^8$ CFU/ml of each
test bacteria were spread over Muller Hinton Agar plates. The sterile filter paper discs (6 mm in diameter) were impregnated with 10 μl of the 3 mg/ml extracts (30 μg/disc) placed on the inoculated agar. The inoculated plates were incubated at 37°C and observed for zone of inhibition after 24 hours. The inhibition zone around each disc was measured in millimeter and the assay was carried out three times for each extract. The results were recorded by measuring the zone of inhibition surrounding the disc.

RESULTS AND DISCUSSION

*Cyclea peltata* (Lam.) Hook. f. & Thoms. is a well known medicinal plant used in a variety of traditional medicines for their usefulness against wide range of diseases including stomach problems, due to the improvement of the diversity of secondary metabolites responsible for their antibacterial activity. The antibacterial activity of the different organic solvents extracts of *Cyclea peltata* root was studied against opportunistic bacterial pathogens isolated from HIV/AIDS patients of Namakkal district. The results of antibacterial screening of petroleum ether, chloroform, ethanol, methanol and acetone root extracts of *C. peltata* (30 mg/disc) are depicted in Table 1. All these extracts showed antibacterial activity to at least two of the tested bacterial pathogens. Among the various solvent extracts tested, petroleum ether and chloroform root extracts showed maximum activity (Zone of inhibition 17 mm) against *K. oxytoca* and *S. hominis* respectively. Similarly ethanol root extract showed second highest inhibition zone (15.6mm) against *K. oxytoca*. The same extract showed moderate inhibition against *S. aureus* (15mm), *S. hominis* (10.6mm), *S. typhi* (10.3mm), *S. marcescens* (9.3mm), *P. aeruginosa* (8.6mm) and *P. mirabilis* (7.3mm). Ethanol extract was appeared to be the most effective extract than other extracts. All other extracts viz petroleum ether, chloroform, methanol and acetone root extracts showed better inhibitory effect on the tested organisms.

In this study we have demonstrated the antibacterial activity of root extracts of *C. peltata*. The antibacterial activity against a wide range of various opportunistic bacterial pathogens isolated from HIV/AIDS patients of Namakkal district. The highest antibacterial activity being demonstrated against *K. oxytoca* and *S. hominis*. *C. peltata* showed maximum activity against *Streptococcus haemolyticus* (16.9mm) and *Klebsiella pneumoniae* (17.4mm). The antibacterial activity was more prominent on the gram negative bacteria than the gram positive bacteria. The antibacterial activity have been screened because of its great medicinal relevance with the recent years, infections have increased to a great extent and resistant against antibiotics become an ever increasing therapeutic problems. The broad
The present study justifies the claimed uses of *C. peltata* in the traditional system of medicine to treat various infection diseases caused by microbes. Emergence of multi drug resistance in human pathogenic bacteria as well as undesirable side effects of certain antibiotics has triggered immense interest in the search for new antimicrobial drugs of plant origin. This study encourages the cultivation of this highly valuable medicinal plant to meet the increasing demand from traditional medicinal system. Traditional indigenous medicine is limited to small tribal and geographical areas called "little traditions" are an excellent repository of knowledge about medicinal properties of botanical sources.

Table – 1: Antibacterial activity of root extracts of *Cyclea peltata* (Lam.) Hook. f. & Thoms. on pathogenic bacteria (Disc diffusion method).

<table>
<thead>
<tr>
<th>Test bacteria</th>
<th>Petroleum ether</th>
<th>Chloroform</th>
<th>Ethanol</th>
<th>Methanol</th>
<th>Acetone</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>K. pneumoniae</em></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>11.6±1.5</td>
<td>—</td>
</tr>
<tr>
<td><em>K. oxytoca</em></td>
<td>17±1</td>
<td>11±1</td>
<td>15.6±0.5</td>
<td>8.6±0.57</td>
<td>—</td>
</tr>
<tr>
<td><em>E. coli</em></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>9.6±0.57</td>
<td>—</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>—</td>
<td>10.6±1.15</td>
<td>8.6±0.57</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><em>P. mirabilis</em></td>
<td>—</td>
<td>—</td>
<td>7.3±0.57</td>
<td>—</td>
<td>7.3±0.57</td>
</tr>
<tr>
<td><em>S. typhi</em></td>
<td>—</td>
<td>—</td>
<td>10.3±0.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><em>S. marcescens</em></td>
<td>—</td>
<td>—</td>
<td>9.3±0.57</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>—</td>
<td>13±1</td>
<td>15±1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><em>S. hominis</em></td>
<td>14.6±0.5</td>
<td>17±1</td>
<td>10.6±1.1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><em>E. faecalis</em></td>
<td>—</td>
<td>—</td>
<td>—</td>
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</tr>
</tbody>
</table>

*Note:* — : No inhibition

**CONCLUSION**

The present investigation concluded that *Cyclea peltata* (Lam.) Hook. f. & Thoms. contain potential antibacterial properties that may be of great use for the development of antimicrobial drugs against various opportunistic bacterial infections. The ethanol and chloroform extracts of *Cyclea peltata* possess significant inhibitory effect against tested opportunistic bacterial pathogens. The results of the study support the folklore claim along with the development of new antimicrobial drugs from the plant.
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