EVALUATION OF ANTIBACTERIAL, ANTIFUNGAL AND ANTHELMINTIC ACTIVITY OF MURRAYA KOENIGII SPRENG

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ABSTRACT
In the present study, the petroleum ether and alcoholic extract of Murraya koenigii Spreng. leaves were subjected to preliminary screening for antimicrobial and anthelmintic activity. A survey of literature revealed that no methodical reports on antibacterial, anti fungal and anthelmintic activity of various extracts of Murraya koenigii Spreng. leaves are available. Therefore it was thought worthwhile to explore this indigenous plant for its activity against different microorganisms. The alcoholic extract exhibited significant antibacterial, antifungal activity, comparable to the standard drug tetracycline. The petroleum ether and alcoholic extract were evaluated for Anthelmintic activity on adult Indian earthworms, ‘Pheretima posithuma’. The alcoholic extract produced more significant Anthelmintic activity than petroleum ether extract and the activities are comparable with the reference drug Piperazine citrate.

Keywords: Antimicrobial, Murraya koenigii, Anthelmintic, Tetracycline, Piperazine citrate.

INTRODUCTION
Since the time immemorial, our traditional system of medicine and folklore claiming that medicinal plants as whole or their parts are being used in all types of skin diseases successfully including anti-bacterial and anti-fungal. The most of the medicinal preparation now-a-days available in the market are either not effective up to the mark or has developed resistance resulting in reoccurrence again. Plant derived drug serve as prototype to develop more effective and less toxic medicines. The plant Murraya koenigii Spreng. (Rutaceae) has been used in folk remedies by Indians and is reported to have a broad range of therapeutic effects, including analgesic, anti-inflammatory, alexiteric, febrifuge activity and is useful in leucoderma and blood disorders. [1]
A survey of literature revealed that no methodical reports on anti bacterial, anti fungal and anthelmintic activity of various extracts of *Murraya koenigii* Spreng. leaves are available. Therefore it was thought worthwhile to explore this indigenous plant for its activity against different microorganisms.

**MATERIALS AND METHODS**

**Plant Material**

Leaves of *Murraya koenigii* Spreng. were collected from the coconut gardens of Salipur, Orissa in the month of December, 2009. The plant was identified, authenticated by Dr. Dibya Sunder Panda and a voucher specimen was kept as (I-5) in the herbarium of Department of Pharmacognosy, Institute of Pharmacy and Technology, Salipur, Orissa.

**Extract Preparation**

The leaves were collected and washed thoroughly in water, chopped, air dried for a week at 35-40°C and pulverized in electric grinder. 150 gm. of the powder subjected to Soxhlet apparatus using solvents such as petroleum ether and alcohol. The solvent was then removed under reduced pressure, which obtained a greenish- black colored residue. The yield was 7.4% and 5.9% respectively. The prepared extracts were used for the antimicrobial and anthelmintic activity.

**EXPERIMENTAL DESIGN**

**Anthelmintic Activity Study**

The Anthelmintic activity was done on adult Indian earth worm 'Pheretima posithuma' due to its anatomical and physiological resemblance with the intestine round worm parasites of human beings. [2, 3] It was collected locally and all are approximately of same size (6-8 cm).

**Study Protocol:**

Four groups of approximately equal size earthworms consisting of six earthworms in each group were used for the present study.

- **Group-1** Control (normal saline)
- **Group-2** Standard (Piperazine citrate- 10mg/ml)
- **Group-3** Pet. ether extract of different concentration (10mg/ml, 50mg/ml, 100mg/ml)
- **Group-4** Alcoholic extract of different concentration (10mg/ml, 50mg/ml, 100mg/ml).
Observations were made for the time taken to paralysis and death in individual worms. Paralysis was said to occur when the worms do not revive even in normal saline. Death was concluded when the worms lost their motility followed with fading away of their body color.\(^{[4,5]}\)

**Anti microbial Study**

**Micro Organisms**

Three strains \([ E. \text{ coli}, \text{ Bacillus subtilis}, \text{ Staphylococcus aureus } ]\), were used for assessing the anti microbial activity standard tetracycline (10\(\mu\)g/ml). Two fungal strains Asperigillus niger and Candida albicans were used for anti-fungal activity. The microorganisms were obtained from the Department of Microbiology, Sri Jayadev College of Pharmaceutical Sciences, Naharakanta, Orissa

**Study Protocol**

Antimicrobial activity was determined by Disc Diffusion method. Muller Hinton and Saboured Dextrose Broth were used as medium for bacterial and fungal strains respectively.\(^{[6,7]}\) Positive control experiment was carried out under the similar condition by using tetracycline (10\(\mu\)g/ml), as it is the broad spectrum antibiotic used effectively for bacteria and fungus.

The petridishes with the bacteria and fungal cultures were incubated at 37\(\pm\)\(2^\circ\)C for 24 hrs and 27\(\pm\)\(2^\circ\)C for 48 hrs respectively. The assessment of anti microbial activity was based on the measurement of diameter of inhibition zone formed. The experiment was repeated thrice and the results were taken as mean of three readings.\(^{[8, 9]}\)

**RESULTS AND DISCUSSION**

From the anthelmintic activity study, the alcoholic extract at a dose of 100mg/ml has significant anthelmintic activity where as petroleum ether showed moderate activity. (Table-1)

The results of antimicrobial activity of petroleum ether and alcoholic extracts of Murraya koenigii were studied and it was found that alcoholic extract of 10mg/ml produced potent antimicrobial activity as it shows more inhibitory zone as compared to other individual concentrations of petroleum ether. The activities are comparable with the reference drug tetracycline (10\(\mu\)g/ml) (Table-2)
TABLE 1: ANTHELMINTIC ACTIVITY OF *MURRAYA KOENIGII* SPRENG. LEAF EXTRACT.

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Con. (mg/ml)</th>
<th>Paralysis time (min.)</th>
<th>Death time (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Control (Normal saline)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Piperazine citrate</td>
<td>10</td>
<td>20.4±0.7</td>
<td>26.3±0.5</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Petroleum ether Extract</td>
<td>10</td>
<td>90.2±1.7</td>
<td>100±2.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>70.2±1.5</td>
<td>90.5±1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>57.2±1.0</td>
<td>70.5±1.7</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Alcoholic Extract</td>
<td>10</td>
<td>86.2±1.8</td>
<td>90.3±1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>67.8±1.3</td>
<td>80.3±2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>40.0±0.9</td>
<td>50.3±0.8</td>
</tr>
</tbody>
</table>

TABLE 2: ANTI MICROBIAL ACTIVITY OF *MURRAYA KOENIGII* SPRENG. REPORT

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Concentration</th>
<th><em>B. subtilis</em></th>
<th><em>E. coli</em></th>
<th><em>S. aureus</em></th>
<th><em>C. albicans</em></th>
<th><em>A. niger</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. koenigii</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet. ether extract</td>
<td>5mg/ml</td>
<td>1.7</td>
<td>2.0</td>
<td>1.7</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>10mg/ml</td>
<td>1.9</td>
<td>2.1</td>
<td>1.8</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Alcoholic extract</td>
<td>5mg/ml</td>
<td>1.9</td>
<td>2.1</td>
<td>1.8</td>
<td>2.0</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>10mg/ml</td>
<td>2.0</td>
<td>2.4</td>
<td>2.1</td>
<td>2.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Standard Tetracycline</td>
<td>10μg/ml</td>
<td>2.1</td>
<td>2.5</td>
<td>2.3</td>
<td>2.9</td>
<td>3.3</td>
</tr>
</tbody>
</table>
CONCLUSION

Though there are a number of antibacterial, anti-fungal and anthelmintic drugs available in the market, they produce many side effects; hence to improve the status of therapy, various ailments of plant extracts like Murraya koenigii Spreng. will be much useful. From the results obtained, it is clear that if a detailed research is carried out on the alcoholic extract of Murraya koenigii, some useful drugs may develop for the treatment of bacterial, fungal and anthelmintic action.

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REFERENCES


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