In-vitro screening of antihelmintic and antibacterial activity of *Malvastrum coromandelianum* leaves

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Abstract

The main objective of the work is to investigate the antihelmintic and antibacterial activity of the *Malvastrum coromandelianum* leaves. The extract was tested for antihelmintic activity against adult Indian earthworm and also tested for antibacterial activity against the gram positive bacteria *S.aureus, B.subtilis* and gram negative bacteria against *E.Coli, P.aerugenosa, P.putida*. The antihelmintic activity was observed at 100mg/ml with reference to standard Albenzazole (10mg/ml). The maximum antibacterial activity was observed in *S.aureus* at 500mg/ml with zone of inhibition 17 mm and next is *S.aureus*, the best antibacterial activity was observed against *P.aerugenosa* and *P.putida* with 15 mm of zone of inhibition. The zone of inhibition of extract was compared with standard Gentamycin 25 µg/ml. The extract shows significant activity against the other bacterial pathogens. From the results, it was concluded that the ethanolic extract of *Malvastrum coromandelianum* leaves have anthelmintic and antibacterial activity.

Keywords: Antibacterial, Anthelmintic, Malvastrum coromandelianum, Gentamycin, Albenzazole.

Introduction

Herbs are any plants "with leaves, seeds, or flowers used for flavoring, food, medicine, or perfume" or parts of "such a plant as used in cooking [1]. The plant products are rich in different therapeutic activities like antimicrobial [6-7], antimalarial, antifungal, hepatoprotective, anthelmintic, antioxidant, anticancer, anti-inflammatory etc. *Malvastrum coromandelianum* is commonly known as false mallow, broom weed, and clock plant. It belongs to the family of malvaceae. It consists of different chemical constituents like alkaloids, tannins, amino acid proteins, and carbohydrates, with appreciable amounts of phenolic and flavonoid contents. The can be used in treatment of different pathological conditions like ring worm infection [2], jaundice [3], diabetes [4], anti-inflammatory and analgesic [5]. Anthelmintics are the agents used to treat helminthiasis. This leads to health complications in humans and cattle’s. The natural agents are more effective for helminthiasis [11] than chemical agent with fewer side effects. Antibacterial agents are the agents which are used to treat different bacterial infections either gram positive or gram negative infections.

Materials And Methods

Collection plant material

The leaf material of *Malvastrum coromandelianum* was collected from surroundings of Aditya Pharmacy College, Surampalem, East Godavari, Andhra Pradesh.

Preparation of Extract

The leaf materials were dried under the shade for 5-7 days and ground to fine powder with the help of electrical grinder. The dried powder of leaves of *Malvastrum coromandelianum* subjected to maceration separately using ethanol for 5 days with intermittent shaking. The extract was prepared by maceration of 80gm of powder with 500ml ethanol solvent. The obtained liquid is subjected to distillation [12]. The extracts thus obtained is then evaporated to dryness and used in present study.
In-Vitro anthelmintic Activity

Test Organisms
Anthelmintic activity; The Healthy adult Indian earthworms Pheretima posthuma due. These organisms are collected from surrounding of SIMS College of Pharmacy, Guntur. Standard Concentration (5mg/ml): 1.25ml of Albendazole suspension was taken and diluted to 10ml with sodium CMC solution. Test extract concentrations: 1gm of ethanolic extract was dissolved in 10ml of sodium CMC which is regarded as (T1) (100mg/ml),5ml of T1 diluted to 10ml of sodium CMC which is regarded as (T2) (50mg/ml),5ml of T2 diluted to 10ml of sodium CMC which is regarded as (T3) (25mg/ml).

Method
The different concentrations of ethanolic extracts of Malvastrum coromandelianum were evaluated for anthelmintic activity using adult Indian earthworm model. The anthelmintic assay was carried as per the method[8] with minor modifications. The extracts exhibited a dose-dependent inhibition of spontaneous motility (paralysis). The earth worm was placed in petridish containing three different concentrations (100, 50&25 mg/ml) of ethanolic extract of leaves of Malvastrum coromandelianum. Each petridish was placed with one worms and observed for paralysis or death. Mean time for paralysis was noted when no movement of any sort could be observed, except when the worm was shaken vigorously; the time death of worm (min) was recorded after ascertaining that worms neither moved when shaken nor when given external stimuli. The test results were compared with reference compound Albendazole (5 mg/ml) treated samples.

In-Vitro Antibacterial Activity
Antibacterial activity; For this study two gram positive bacteria such as S.aureus, B.subtilis and three gram negative bacteria such as E.Coli, P.aerugenosa, P.putida are used [9]. These cultures are procured from MicrobesSpeciality Lab Danavaiapeta, Rajahmundry,East Godavari District 533103, AndhraPradesh, India. The nutrient agar media was used for antibacterial test. The concentrations of test compounds were prepare by dissolving the dried extract in Sodium CMC at a concentration of 100mg/ml, 300mg/ml and 500mg/ml. The reference standard Gentamycin was prepared at a concentration of (25 µg/ml). All the plates were kept in a refrigerator at 2 to 8 ºC for a period of 2 hours for effective diffusion of test compounds and standards. Later, they were incubated at 37ºc for 24 hours. The presence of definite zone of inhibition of any size around the cup indicated antibacterial activity. The diameter of the zone of inhibition was measured and recorded. It was done in triplicate and mean of zone of inhibition was calculated.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Concentration</th>
<th>Time taken for Paralysis (min)</th>
<th>Time taken for Death (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5% Sodium CMC control</td>
<td>10 mg/ml</td>
<td>22.90 ± 2.90</td>
<td>52.42 ± 2.32</td>
</tr>
<tr>
<td>Albendazole</td>
<td>100 mg/ml (T1)</td>
<td>9.44 ± 1.23</td>
<td>33.02 ± 1.97</td>
</tr>
<tr>
<td></td>
<td>50 mg/ml (T2)</td>
<td>21.95 ± 1.19</td>
<td>42.66 ± 0.71</td>
</tr>
<tr>
<td></td>
<td>25 mg/ml (T3)</td>
<td>25.26 ± 1.28</td>
<td>54.51 ± 2.56</td>
</tr>
</tbody>
</table>

Fig: 01 Anthelmintic Activity of Ethanolic Extracts of Malvastrum Coromandelianum Leaves on Earthworms
In-Vitro antibacterial activity

Table: 02 Antibacterial Activity Of Ethanolic Extracts Of Malvastrum Cormandelianum Leaves On Some Gram Positive & Negative Bacteria

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Zone of inhibition (mm)</th>
<th>100 mg/ml</th>
<th>200 mg/ml</th>
<th>300 mg/ml</th>
<th>Gentamycin 25 μg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus</td>
<td>15 ± 0.21</td>
<td>16 ± 0.26</td>
<td>17 ± 0.15</td>
<td>12 ± 0.12</td>
<td></td>
</tr>
<tr>
<td>B. subtilis</td>
<td>11 ± 0.62</td>
<td>12 ± 0.64</td>
<td>13 ± 0.21</td>
<td>12 ± 0.12</td>
<td></td>
</tr>
<tr>
<td>E. coli</td>
<td>11 ± 0.48</td>
<td>12 ± 0.48</td>
<td>13 ± 0.52</td>
<td>12 ± 0.12</td>
<td></td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>12 ± 0.36</td>
<td>13 ± 0.39</td>
<td>15 ± 0.53</td>
<td>12 ± 0.12</td>
<td></td>
</tr>
<tr>
<td>P. putida</td>
<td>13 ± 0.26</td>
<td>13 ± 0.52</td>
<td>15 ± 0.25</td>
<td>12 ± 0.12</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The results indicate that the ethanolic extract of Malvastrum cormandelianum showed the best anthelmintic activity at concentration of 100 mg/ml within 33min. The anthelmintic effect of extracts is comparable with that of the effect produced by the standard drug albendazole (10 mg/ml). All three concentrations have significant activity against earthworm with vary in duration of time. The antibacterial activity of leaves extract with different concentrations 100 mg/ml, 300 mg/ml and 500mg/ml was very well compared with standard reference drug Gentamycin 25 μg/ml. The maximum zone of inhibition was observed in S.aureus at 17 mm and next is S.aureus, the best antibacterial activity was observed against P.aeruginosa and P.putida with 15 mm of zone of inhibition. The extract has significant antibacterial activity against all microorganisms.

Conclusion

In present days, many microorganisms developing resistance to different chemical agent. So, it is necessary to develop new antibiotics. From the discussion, it is concluded that the ethanolic extract of Malvastrum cormandelianum leaves have Anthelmintic activity and Antibacterial activity against the adult Indian earthworm and some pathogenic microorganisms respectively.

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References