Antimicrobial activity of Butanol extract of Malaxis acuminata

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ABSTRACT

The antimicrobial activity of pseudobulbs of Malaxis acuminata (Ref. NISCAIR/RHMD/Consult-2011-12/1717/17) has been studied using the Butanol extract against some gram (+)ve, Gram (-)ve bacteria and fungi by agar cup diffusion method. The butanol extract was tested against five bacterial species and one fungal species. The pattern of inhibition varied with the different extract concentration and the organism tested. The butanol extract showed better fungal inhibition than bacterial inhibition.

Key words: Antimicrobial agent, Plant extract, Agar cup-diffusion method, Malaxis acuminata

INTRODUCTION

Malaxis acuminata is a worldwide soil loving plant that grows in the shady areas of semi-evergreen to shrubby forest, belonging to the family Orchidaceae, common name Jeevak. Its dried pseudo-bulbs are important ingredients of several Ayurvedic preparations, therefore it is well known for its medicinal properties. It is found in India, China, and South-East Asia, at elevations up to 1400 m. It belongs to Ashtverga (combination of eight drugs) which is an important constituent of several Ayurvedic preparations. Malaxis acuminata is also used to increase the quantity of semen or to stimulate the production of seminal weakness, internal and external antidysenteric, febrifuge and tonic. It is used in condition of sterility, vitiated semen.

Paste of pseudobulbs is useful for as external application in insect bites and haemorrhages, dysentery, fever, emaciation, burning sensation and general condition of pitta and vata, seminal weakness, internal and external antidysenteric, febrifuge and tonic. It is used in condition of sterility, vitiated semen.

Micro-organism:
The following five strains of bacteria and one strain of fungi were used as test micro-organisms respectively: Staphylococcus aureus, Escherichia coli, Klebsiella aerogenes, Pseudomonas aeruginosa, Proteus mirabilis and Candida albicans.

Preparation of inoculum:
The Nutrient broth was sterilized by autoclaving at 15 lbs/sq inch for 15 minutes. A loopful of organism was transferred from a laboratory maintained mother culture into 100 ml conical flask containing sterilized Nutrient broth. The flask was incubated for 24 hours at 37°C.

Reference and Control:
Amoxyclillin was chosen as the reference for all bacterial species used: Escherichia coli, Klebsiella aerogenes, Pseudomonas aeruginosa, Proteus mirabilis, Staphylococcus aureus and Fluconazole as a reference for the fungus, Candida albicans.

Aseptic conditions:
Experiment was carried out in aseptic area containing Laminar flow bench which is equipped with UV lamp emitting UV rays.

Determination of Zone of inhibition:
For evaluation of antibacterial activity dehydrated nutrient agar medium was used and agar cup diffusion method was employed. Each petridish carried a blank and standard samples to compare the resulting zone of inhibition. DMF (Dimethyl formamide) was used as blank and it did not show inhibition zone. Extract at concentration of 5mg/ml, 10mg/ml, 25mg/ml and 50mg/ml were tested against bacteria E. Coli, P. aerogenes, P. mirabilis, K. aerogenes, S. aureus and fungi, C. albicans. The activity of extract was compared with standard drugs (Amoxycillin and Fluconazole). The plates were incubated at 37°C for 24 h and 48 h for fungi. The zone of inhibition (mm) of extract at different concentration is tabulated in Table 1.

Table 1- Antimicrobial activity of Butanol extract of M. acuminata against pathogens

<table>
<thead>
<tr>
<th>S.no</th>
<th>Extract concentration and standards</th>
<th>Zone of inhibition (mm)</th>
<th>S. aureus</th>
<th>E. coli</th>
<th>P. aerogenes</th>
<th>P. mirabilis</th>
<th>C. albicans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5mg/ml</td>
<td>12</td>
<td>11</td>
<td>18</td>
<td>17</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>10mg/ml</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>19</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>25mg/ml</td>
<td>16</td>
<td>17</td>
<td>24</td>
<td>20</td>
<td>16</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>50mg/ml</td>
<td>18</td>
<td>19</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>Fluconazole (50µg/ml)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>Amoxyclillin (50µg/ml)</td>
<td>28</td>
<td>22</td>
<td>36</td>
<td>30</td>
<td>18</td>
<td>-</td>
</tr>
</tbody>
</table>

Cup diameter = 8mm

RESULT AND DISCUSSION:
The antimicrobial data obtained from the agar cup diffusion method have been shown in Table 1. It reveals that various extract concentration of Malaxis acuminata exhibited antifungal and anti bacterial activity with reference to Fluconazole and Amoxyclillin. The highest activity of Malaxis was found against fungus Candida albicans in comparison to the reference Fluconazole. The Susceptibility pattern of tested organisms against different conc. of the extract and control antibiotics is shown in Figure 1.
CONCLUSION:
The antimicrobial study by agar cup diffusion method shows that the plant *M. acuminata* has an antibacterial activity comparable to that of the commercial antibiotics. The antifungal activity was equivalent to that of reference Fluconazole exhibiting a potent antifungal activity.

REFERENCES:

Figure 1: Susceptibility pattern of tested organisms against different conc. of extract and control antibiotics.

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