Screening of Antifungal Potential of Leaf Extracts from *Albizia lebbeck* (L.) Benth

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Abstract

The antifungal activity of *Albizia lebbeck* Benth. (L.) was performed against selected pathogenic fungal strains namely *Aspergillus niger, Aspergillus flavus, Penicillium citrinum* and *Rhizopus oryzae*. Crude extracts from leaves of *Albizia lebbeck* Benth showed significant antimicrobial effect. Among different extracts, a methanolic extract of *A. lebbeck* showed highest zone of inhibition. The order of antifungal activity, expressed as minimum inhibitory concentration (MIC) of Methanol > Ethyl acetate > Petroleum ether observed for fungal strains tested. Methanol and ethyl acetate extracts exhibited significant antimicrobial activity than petroleum ether extract and may be suggested for use as natural antibiotic administration for the fungal diseases.

**Key words:** Antifungal properties, MIC, Pathogenic fungal strains

Introduction

*Albizia lebbeck* Benth. (L.) (AL) commonly known as Shirish has number of therapeutic properties (1). AL is an economically important plant for industrial and medicinal uses. The leaves are good fodder with rich protein content (2). The plant contains saponin, macrocyclic alkaloids, phenolic glycosides and flavonols (3). In ayurvedic medicine, it is considered as an antidote against all types of poisons (4). The ayurvedic formulation of shirish like *Panch shirish agada* and *Mahagandhahasti agad* etc. has been indicated in poisoning. However, it has been established that no part of the plant has any antidotal value against either snake or scorpion venoms. In addition, the bark decoction of AL possesses anti-anaphylactic, anti-asthmatic activity and these potentials can be assumed as supportive measures in poisoning treatment (5). Saponin isolated from AL bark and methanolic pod extract of AL possess antispermatogenic effect. AL also has analgesic, anti-inflammatory, anti-diarrheal, anxiolytic and nootropic activity (6). The bark of *A. lebbeck* has been previously shown to possess antimicrobial activities against *E. coli, S. typhi, P. aeruginosa, S. aureus, Bacillus cereus, Klebsiella aerogenes, Proteus vulgaris, Shigella boydid, Aspergillus fumigatus, Aspergillus flavus, A. niger, C. albicans, Salmonella typhimurium, Salmonella enteritidis, Shigella dysenteria, Shigella flexneri, C. albicans, Candida tropicalis* and *Candida krusei* (7-9). Earlier investigations, a number of plants have been reported for antimicrobial properties across the world (10-12). The extract from leaves of *Albizia lebbeck* Benth was not reported for antifungal activities. Hence, the present study was focused on investigation of antifungal study from the leaves of *Albizia lebbeck* Benth.

Materials and methods

Plant material and preparation of crude extract : Aerial parts (leaf) of *Albizia lebbeck* plants were collected from botanical garden of MCAS, Raspuram. The collected plant material was shade dried and ground well in a grinder with 2 mm diameter mesh. The dry powered plant materials (50 g) were extracted successively with 200 ml of petroleum ether, ethyl acetate, methanol...
by using soxhlet apparatus for 48 hrs at a temperature not exceeding the boiling point of the solvent. The aqueous extracts were filtered using whatman filter paper (No.1) and then concentrated in vacuums at 40 °C using rotary evaporator. The residues obtained were stored in a freezer -80 °C until further tests (13, 14).

**Agar disc diffusion method:** The crude extracts were used for bioassay against the fungal species which includes, *Aspergillus niger* (IMI no: 500308), *Aspergillus flavus* (500309), *Penicillium citrinum* (500310) and *Rhizopus oryzae* (500312). Inoculums were prepared from the 24 hours old culture of standard fungal isolates in Potato dextrose broth. Potato dextrose plates were prepared and the inocula were seeded by spread plate method. In the prepared Potato dextrose agar plates the well was prepared with equal distance in the size of 4mm. The prepared wells were loaded with 250, 500, 1000 and 2000 μg of plant extracts. The plates were incubated at 37 °C for 24 - 48 h (15). Antifungal activity was evaluated by measuring the inhibition zone in millimeter in diameter and tabulated. All the samples were done in triplicate. Both positive and negative controls were determined, for negative control the three solvents (petroleum ether, ethyl acetate and methanol) were also used to determine their effect on test organisms.

**Results and discussion**

Plants and their preparations have been used as medicines against infectious diseases. The plants are rich in secondary metabolites which include alkaloids, glycosides, flavonoids, insecticides, steroids, related active metabolites which are of great medicinal value and have been extensively used in the drug and pharmaceutical industry (16). The antifungal study results revealed that methanolic extracts of *A. lebbeck* conferred widest spectrum activities that inhibited the growth of all studied pathogens with zone of inhibition. The methanolic extracts of *A. lebbeck* illustrated the highest zone of inhibition against the plant pathogens *Aspergillus niger* (17 mm), *Aspergillus flavus* (18 mm), *Penicillium citrinum* (16 mm), and *Rhizopus oryzae* (18 mm). The ethyl acetate extracts demonstrated maximum zone of inhibition against *Aspergillus niger* (18 mm), *Aspergillus flavus* (16 mm), *Penicillium citrinum* (18 mm) and *Rhizopus oryzae* (18 mm). The petroleum ether extracts demonstrated maximum zone of inhibition against *Aspergillus niger* (19 mm), *Aspergillus flavus* (17 mm), *Penicillium citrinum* (15 mm) and *Rhizopus oryzae* (16 mm). (Table 1).

<table>
<thead>
<tr>
<th>Solvent extract</th>
<th>Organisms</th>
<th>Zone of inhibition(mm)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Petroleum Ether (μg)</td>
<td>Ethyl Acetate (μg)</td>
</tr>
<tr>
<td>250</td>
<td>500</td>
<td>1000</td>
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<tr>
<td>Control</td>
<td>-</td>
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</tr>
<tr>
<td>A. niger</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>A. flavus</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>P. citrinum</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>R. oryzae</td>
<td>10</td>
<td>12</td>
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</table>

The results of the present study confirm the antifungal activity of *A. lebbeck* and the antifungal effects of leaf extracts were shown in the Figure 1 & 2.

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In previous studies, Shahid and Firdous in 2012 tested the order of antifungal activity, observed in *A. lebbeck* benth. was seed > pod > flower > roots against six fungal strains such as *Aspergillus parasiticus*, *Aspergillus Niger*, *Candida albicans*, *Aspergillus effusus*, *Fusarium solani* and *Saccharomyces cerevisiae* and compared with Itraconazole and AmphoteracinB. Similarly, Mohammed Nazneen Bobby et al (2012) reported antibacterial effect of *Albizia lebbeck* against the bacterial pathogens and stated that methanol and ethyl acetate extracts exhibited slightly higher efficacy than petroleum ether extracts. However, the antifungal activity from leaf extracts of *A. lebbeck* was not reported and hence, the present study provides desirable data which is used in formulation of therapeutic products from plant origin. Johnson et al (2010) have reported that methanol was the most effective solvent for plant extraction than hexane and water (17). Uzama Danlami and Enuladu Patience Elisha (2017) reported that the *Albizia lebbeck* and its mistletoe leaves extracts have good potency for antimicrobial activity and found greater zone of inhibition against the fungal strains such as *Aspergillus fumigatus* (16 mm), *Aspergillus niger* (14 mm), *Fusarium oxysporum* (9 mm) from the ethanol extract of mistletoe leaves of *Albizia lebbeck* (18). Similarly, Ali et al (2018) reported that the petroleum ether, ethyl acetate and methanol bark extract of *A. Lebbeck* have shown the significant antimicrobial activity against the test organisms namely, *Candida arrizae*, *Aspergillus fumigatus*, *Aspergillus*...
**niger, Rhizopus oryzae, Candida albicans, Saccharomyces cerevisiae, Candida krusei and**
they found that among all the ethyl acetate extracts of *A. Lebbeck* have the most potential antimicrobial (19). However, the findings of the present study proved that the leaf extract of *A. lebbeck* can be used as potential source antifungal studies.

**Conclusion**

*A. lebbeck* is the potential source of bioactive compounds that could be used to formulate potent antimicrobial drugs of natural origin. The findings of this study proved that the extracts of *A. lebbeck* has antifungal activity and which might be helpful in preventing the diseases caused by pathogenic organisms and can be used as alternative system of medicine.

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**Conflict of interest** None declared

**References**


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