Antifungal activity of *Sesbania grandiflora* ethanolic leaf extract against dermatophytes - An *in vitro* study

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**ABSTRACT**

**Aim:** The objective of the study is to evaluate *in vitro* antifungal activity of *Acacia catechu* against three human pathogenic fungi, *Trichophyton rubrum*, *Microsporum gypseum*, and *Epidermophyton floccosum*. **Background:** *Acacia catechu* is an evergreen tree which possesses lots of medical value. It exhibits diverse pharmacological actions such as hepatoprotective, antibacterial, antifungal, anti-inflammatory, and antioxidant activity. The herbal extract was tested against various concentrations adopting agar well-diffusion method. The antidermatophytic activity indicated that the extract was ineffective and did not show any activity.

**KEY WORDS:** *Acacia catechu*, Antifungal, Dermatophytes, Zone of Inhibition

**INTRODUCTION**

Dermatophytes are a group of filamentous fungi that cause infections of the skin. Diseases caused by dermatophytes include athlete’s foot, ringworm, and nail infections. Dermatophyte infections in immunocompromised patients can be quite severe. Dermatophytes are fungi that require keratin for growth. The organisms colonize the keratin tissues, and inflammation is caused by host response to metabolic by-products. These infections are long lasting and are difficult to treat.

The incidence of dermatophytic infections has increased in the past decades. Dermatophytes are responsible for serious human pathogenic disorders in various parts of the world. The incidence of these infections are more in tropical countries, and their humid climate, population, and poor hygiene make an ideal condition for the growth of these organisms. Although control measures are available, they have limited effectiveness. Conventional antifungal agents such as chlorhexidine and imidazole derivatives have limited uses. Due to their common side effects such as hepatotoxicity, nausea, diarrhea, and impotency, the use is restricted in pregnant and the young people.

Dermatophytic infections can be treated either topically or systemically; the method chosen will depend on the type of infection, the severity of the infection, and the patient’s preferences.

*Acacia catechu* commonly known as Karungali in Tamil and Khadira in Sanskrit is an evergreen tree with lots of nutritional and medicinal value. People in Kerala consume Karungali water for relieving digestive disorders. *Acacia catechu* exhibits diverse pharmacological effects such as antibacterial, antioxidant, hepatoprotective, anti-inflammatory, antiviral, analgesic, antipyretic, antiallergic, and anticancer activity. The phytochemical constituents such as epigallocatechin, epicatechin, rutin, quercetin present in it produces antibacterial and antioxidant effects.

Keeping this in view, the present study was designed to evaluate the *in vitro* antidermatophytic activity of *Ficus racemosa* against *Microsporum gypseum*, *Trichophyton rubrum*, and *Epidermophyton floccosum*.

**MATERIALS AND METHODS**

**Plant Material**

*A. catechu* Wild bark (AAE/9007) was collected from Hosur, Tamil Nadu, and was authenticated by Dr. H. B Singh, raw materials herbarium and museum, National Institute of Science Communication and Information Resources, New Delhi. The voucher
specimen is preserved for further use in Green Chem laboratory, Bangalore.

**Ethanolic Extraction**

Barks were shade dried for a week. Dried barks were milled to fine powder. Powder was passed through 100 mesh sieve and stored in a sealed polythene bag. 2.5 kg of powdered *A. catechu* bark were extracted with 10 L of ethanol, at 65°C temperature, for 1 h, in a 20 L round bottom flask with Graham condenser attached. Condenser was cooled circulating with chilled water. After 1 h of extraction, round bottom flask was cooled to room temperature, and the extract was filtered and collected. The marc was extracted repeatedly with 10 L of ethanol, twice. The extracts were filtered and collected. The combined extracts were evaporated to dryness under reduced pressure in a Buchi Rotary Evaporator (Switzerland) at 65°C, to obtain 150 g of powder extract. The w/w yield of the prepared extract was 6%. The extract was stored at 4°C until used.

**Fungal Cultures**

Three fungal pathogens used were procured from the Institute of Microbial Type Culture Collection, Chandigarh, namely *M. gypseum* MTCC No. 2819, *T. rubrum* MTCC No.296, and *E. floccosum* MTCC No.613 and are maintained in Sabouraud Dextrose Agar.

**Antifungal Activity**

**Well-diffusion method**

On sterile plates containing Sabouraud’s dextrose agar, the fungal cultures were swabbed. Wells of 6 mm diameter were bored in each plate. The wells were filled with varying concentrations of the sample. The plates were incubated at 28°C for 72 h for evaluation. The diameter of inhibition zones formed around the wells was measured in millimeter. The study was performed in duplicates for all the samples [Table 1].[30]

**RESULTS AND DISCUSSION**

**M. gypseum**

*M. gypseum* has been described as causing subcutaneous mycosis in humans and has been associated with opportunistic infections occurring in patients with human immunodeficiency virus[24-26] *M. gypseum* a geophilic dermatophyte is rarely isolated from patients with acquired immunodeficiency syndrome. The clinical presentation resembled psoriasis characterized by atypical, scaly, and hyperkeratotic lesions. Which usually produces a single inflammatory skin or scalp lesion. Invaded hairs show an ectothrix infection but do not fluoresce under Wood’s ultraviolet light. Colonies grow moderately rapidly and darken from buff to cinnamon brown, often with granular to sugary texture imparted by heavy sporulation.

<table>
<thead>
<tr>
<th>Micro organism</th>
<th>15/ml</th>
<th>25/ml</th>
<th>50 mg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Microsporum gypseum</em></td>
<td>No activity</td>
<td>No activity</td>
<td>No activity</td>
</tr>
<tr>
<td><em>Epidermophyton floccosum</em></td>
<td>No activity</td>
<td>No activity</td>
<td>No activity</td>
</tr>
<tr>
<td><em>Trichophyton rubrum</em></td>
<td>No activity</td>
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<td>No activity</td>
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</table>

**E. floccosum**

*E. floccosum* is an anthropilic dematophyte worldwide in distribution. Humans and animals act as a host for this dermatophyte, and the infection spreads by contact. These dermatophytes affect the cornified layers of epidermis. Their infection is more aggressive in immunocompromised individuals.[27-29] *E. floccosum* has the ability to cause tinea pedis, tinea cruris, tinea corporis, and onychomycosis (ringworm of the nail).[1] Like all dermatophytes, *E. floccosum* contains keratinase giving it the ability to breakdown keratin a protein commonly found within the skin, nails, and hair. If a patient has a disease caused by this particular species, the main drugs to fight the fungus are terbinafine, ketoconazole, and itraconazole.

**T. rubrum**

*T. rubrum* is an anthropophilic saprotroph. They are usually restricted to the upper layers of epidermis, and deeper infections may also occur. They manifest as both acute and chronic infections affect men more commonly than women and these infections are known to form folliculitis which is characterized by foreign body giant cells and fungal elements. In patients with immunodeficiency, extensive granuloma formation is seen. Infected hairs do not fluoresce under Wood’s ultraviolet light, and microscopically may show endothrix or ectothrix type of invasion. One such commonly isolated fungus species in human nail infections is *T. rubrum*. *T. rubrum* is the complex name associated with scientists with a dermatophytic kind of fungus.

The study shows that there is no significant antifungal activity while testing against three dermatophytes in which the *M. gypseum* and *E. floccosum* are most commonly affecting human and animal.[30]

**CONCLUSION**

Dermatophytooses are refractory to treatment, and the spectrum of antifungal for treating dermatophytooses is narrow. However, we suggest that *A. catechu* bark
extract does not exhibit pharmacological effects and could not be employed in the management of cutaneous infections.

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REFERENCES


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