ANTIFUNGAL POTENTIAL OF ASHWAGANDHA AGAINST SOME PATHOGENIC FUNGI

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ABSTRACT

Withania somnifera also known as Ashwagandha was evaluated for its antifungal activity against some pathogenic fungi. Extracts in different organic solvents were used for disc diffusion assay. Hexane and ethyl acetate extracts have showed maximum inhibition zone against A. niger (15mm and 12.2mm respectively). Methanol extract showed maximum activity against F. oxysporium (13.0mm) and A. flavus (15mm) while aqueous extract showed maximum activity against F. moniliformis (9.6mm).

Key words Antifungal, Withania somnifera, Aspergillus sps., Fusarium sps., Disc diffusion.

INTRODUCTION

Withania somnifera L. (Dunal) belongs to family Solanaceae and is classically known for its rejuvenate benefits. It has recently been referred to as Indian ginseng for its reputed restorative benefits. The wild plant is generally an erect branching shrub, grows approximately up to a height of one meter. The plant is used for the treatment of tuberculosis, rheumatism, inflammatory conditions, and a potential antitumor agent (Chopra et al., 1958, Suffness and Douros, 1982). Most of the active principles of ayurvedic and unani medicines are found in W. somnifera and around hundred different preparations are already commercially available (Tripathi et al., 1996). Many pharmacological studies have been conducted to investigate the properties of ashwagandha in an attempt to authenticate its use as a multi-purpose medicinal agent. For example, anti-inflammatory properties have been investigated to validate its use in inflammatory arthritis (Anbalagan and Sadique, 1981) and animal stress studies have been performed to investigate its use as an antistress agent (Dadkar et al., 1987; Archana and Namasivayan, 1999; Dhuley, 1998; Singh et al., 1982). Several studies have examined the antitumor and radiosensitizing effect of Withania somnifera (Singh et al., 1986; Devi et al., 1992; Devi, 1996).

The plant contains tropane alkaloids such as tropine, hygrine, anferine and a number of steroidal lactones known as Withanolides. Recently W. somnifera L. was also used to inhibit the development of tolerance and dependence on chronic use of various phytotrope drugs (Gupta and Rana, 2007).

The tribal especially Bheel and Garasodia give root powder orally to the male patients of asthma and bronchitis (Singh and Paney 1998). Methanolic extract of the plant was found to reduce leucopenia induced by radiation (Kuttan, 1996).

However, the last few years have seen a major increase in their use in the developed world. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world (Singh and Paney 1998;
Kuttan, 1996). A number of medicinal plants are being used to cure various diseases caused by microbes. Hence the present study was undertaken to investigate the antifungal activity against selected pathogenic fungi (Aspergillus sps, Fusarium sps) using various extracts of Withania somnifera.

**Plant Material and Chemical Extraction:**
The dried leaves of Withania somnifera were procured from the garden, Singhania University, Pacheri Bari, Jhunjhunu, Rajasthan. Leaves were air dried and extracted with methanol, di-ethylether, hexane, distilled water using a Soxhlet apparatus. The extracts were filtered and concentrated in vacuo.

**Test organisms:** Four test organisms, Aspergillus niger, A. flavus, Fusarium oxysporium, F. moniliformis, were obtained from Plant Pathology Laboratory, University of Rajasthan, Jaipur, Rajasthan and maintained on Potato Dextrose Agar (PDA).

**Bioassay:** Disc diffusion bioassay was employed for testing antifungal activity of plant extracts (Linday, 1962). The readymade PDA medium (Hi-media, 39g) was suspended in distilled water and autoclaved at pressure of 15lbs for 20min. Seven days old cultures of test organisms (0.5 ml) were seeded onto plate and uniformly spread with spreader. Paper discs measuring 6mm diameter, that absorbs about 0.1ml of the test sample and a known quantity of standard reference antibiotic (Fluconazole) were used. The inoculated plates were kept at 5°C for 45-55min and then incubated at 25-27°C for 48hrs. The inhibition zone was measured and compared with those of the standard reference antibiotics. Three to four replicates were maintained for each treatment.

**Table 1:** Antifungal activity of Withania somnifera (leaves) extract on different fungi.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Extract</th>
<th>F. oxysporium</th>
<th>F. moniliformis</th>
<th>A. flavus</th>
<th>A. niger</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Haxane</td>
<td>11.3</td>
<td>10.2</td>
<td>12.4</td>
<td>15.0</td>
</tr>
<tr>
<td>2</td>
<td>Ethyl acetate</td>
<td>9.6</td>
<td>9.0</td>
<td>10.0</td>
<td>12.2</td>
</tr>
<tr>
<td>3</td>
<td>Methanol</td>
<td>13.0</td>
<td>11.4</td>
<td>15.0</td>
<td>12.0</td>
</tr>
<tr>
<td>4</td>
<td>Aqueous</td>
<td>7</td>
<td>9.6</td>
<td>7.9</td>
<td>8.3</td>
</tr>
<tr>
<td>5</td>
<td>Fluconazole*</td>
<td>12.0</td>
<td>11.5</td>
<td>12.8</td>
<td>14.7</td>
</tr>
</tbody>
</table>

* Standard drug for fungi30mg/ml

**Figure 1.** Effect of different extracts of Withania somnifera (leaves) extract on (A) Fusarium oxysporium and (B) Aspergillus niger (a = Aqueous extract, b = Ethyl acetate extract, C= Standard Fluconazole, d= Methanol extract and e = Haxane extract)
RESULTS AND DISCUSSION

Effect of different solvent extracts of *Withania somnifera* leaves were tested against four fungi (Table 1).

All the tested extracts inhibited the fungal species with varying degree of sensitivity. The antifungal activity was very less found in aqueous extract. The diameter of inhibition zones ranged from 7 to 15mm among different fungal species. Hexane and ethyl acetate extracts have showed maximum inhibition zone against *A. niger* (15mm and 12.2mm respectively). Methanol extract showed maximum activity against *F. oxysporium* (13.0mm) and *A. flavus* (15mm) while aqueous extract showed maximum activity against *F. moniliformis* (9.6mm).

A similar study of screening the natural plant extracts against different fungal and bacterial pathogens was well recorded in literature (Ahmad et al., 2000; Fabry et al., 1998; De Boer et al., 2005; Nair et al., 2005; Chung et al., 2004). Since plants have co-evolved with pathogens, it is reasonable to expect a variety of such compounds with specific as well as general antifungal activity (Darokar et al., 1998). The present study has shown that the extracts of *Withania somnifera* possess remarkable antifungal activity against many pathogenic fungi. This activity may be due to presence of alkaloids and steroidal lactones (Withanolides) in *Withania* Thus, there is a possibility of developing this plant as a source of antifungal agent and further investigations are necessary to identify the bioactive principles.

REFERENCES


Linday EM. Practical Introduction to Microbiology, (E & FN Spon Ltd), 1962: 77.


