SCREENING OF IRANIAN PLANTS FOR ANTIFUNGAL ACTIVITY: PART 1


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ABSTRACT
In this study, 250 species from 37 families of native Iranian plants were screened for in vitro antifungal activity against 19 fungal strains in vitro. Primarily, the crude extracts at concentration of 100 μg/ml were tested. Of 250 extracts tested, 185(74%) showed antifungal activity against at least one fungal strain. The outstanding species were Artemisia aucheri, Artemisia scoparia, Carthamus oxyacantha, Francoeuria undulata, Tripleurospermum disciforme, and Xanthium spinosum.

Keywords: Iranian plants, Crude extract, Antifungal activity

INTRODUCTION
In the recent years, interest in novel, safe and effective antifungal agents has grown with increased incidences of fungal infections in immunocompromised patients. In the field of natural products with antymycotic activity, higher plants still remain largely unexpected in comparison with microorganisms and marine invertebrates (1). The biological activities of some plants have previously been reported (2-4) and in the present study antifungal activity of a number of native Iranian plants are reported. Some of plants of this study are used by rural inhabitants as herbal medicine and were gathered from different locations of Iran since 1984.

MATERIALS AND METHODS
Plant material
The aerial parts of the plants were collected from different regions of Iran. The voucher specimens were prepared and authenticated (5-8). The herbarium samples are kept at the Herbarium of Department of Pharmacognosy, School of Pharmacy, Tehran University of Medical Sciences.

Extraction procedure
The air-dried plant materials were ground into fine powders and extracted in a soxhlet extractor with 80% methanol.
After filtration of total extracts, the solvent was removed under reduced pressure to give crude extracts which were kept in sterile vials with certain codes at 4°C.

Antifungal activity screening
The crude extracts were tested at a concentration of 100 μg/ml against microorganisms listed in table 1, using the procedure described previously (9). The fungi were cultured on Sabouraud Dextrose Agar and their growth was observed at 25-35°C after 72-168 hrs incubation. The antifungal activity of the extracts were expressed by two symbols “-” (no effect), and “**” (complete growth inhibition)(9).

Girotodulin (for dermatophytes strains) and amphotericin-B for the rest of the strains were used as positive control and methanol was used as negative control in these assays (10).

Microorganisms
The used strains are shown in Table 1. All strains were isolated from local patients and were identified and classified by the medical mycologists in the School of Public Health of Tehran University of Medical Sciences. The strains were recultured and used for this study.

RESULTS AND DISCUSSION
Scientific name of the identified plant species and the results of their antifungal activity are summarized in Table 2 in alphabetical order according to their botanical names of plant families.

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Table 1. The microorganisms that were used in the antifungal activity screening of plants.

<table>
<thead>
<tr>
<th>No.</th>
<th>Microorganisms</th>
<th>No.</th>
<th>Microorganisms</th>
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<tbody>
<tr>
<td>1</td>
<td>Candida albicans</td>
<td>11</td>
<td>Epidermophyton floccosum</td>
</tr>
<tr>
<td>2</td>
<td>Aspergillus niger</td>
<td>12</td>
<td>Saccharomyces cerevisiae</td>
</tr>
<tr>
<td>3</td>
<td>Aspergillus fumigatus</td>
<td>13</td>
<td>Sporotrich schenckii</td>
</tr>
<tr>
<td>4</td>
<td>Microsporum canis</td>
<td>14</td>
<td>Chadosporium berbeeii</td>
</tr>
<tr>
<td>5</td>
<td>Microsporum gypseum</td>
<td>15</td>
<td>Penicillium notatum</td>
</tr>
<tr>
<td>6</td>
<td>Trichophyton violaceum</td>
<td>16</td>
<td>Cryptococcus neoformans</td>
</tr>
<tr>
<td>7</td>
<td>Trichophyton verrucosum</td>
<td>17</td>
<td>T. crutis axiostis mus</td>
</tr>
<tr>
<td>8</td>
<td>Trichophyton schoenleini</td>
<td>18</td>
<td>Pseudoallesheria boydii</td>
</tr>
<tr>
<td>9</td>
<td>Trichophyton mentagrophytes</td>
<td>19</td>
<td>Candida parapsilosis</td>
</tr>
<tr>
<td>10</td>
<td>Trichophyton rubrum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 2, of 248 extracts of Iranian indigenous species belonging to 37 plant families, 185 showed antifungal effects against one or more fungal strains. The most effective plants were Artemisia absinthi, Artemisia scoparia, Cardamomum cucumum, Francoecia undulata, Trileeuropseudum disciforme, and Xanthium spinosum which exhibited activity against at least 50% of fungal strains. The most sensitive fungal strains were Trichophyton violaceum (57.14%), Microsporum canis (51.52%), Epidermophyton floccosum (48.73%), Trichophyton mentagrophytes (39.34%), Trichophyton schoenleini (38.51%), Microsporum gypseum (35.5%), Trichophyton verrucosum (35%) and Trichophyton rubrum (30%).

Of all plants tested, the Compositae family was highly ranked with 66 effective species (78.57%). The second and third most effective families were, Cruciferae and Compositae, which exhibited 21 (75%) and 18 (72%) bioactive members respectively. Reviewing the literature revealed that antifungal activity of plant species of the present study have not been reported previously. The specific geobotanical and climatic conditions of Iran may facilitate the production of active substances in comparison with the same species growing wildly in other lands. We hope these results would provide a basis for the isolation of active compounds from these medicinal plants.

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REFERENCES