

Antifungal Susceptibility of Dermatophytes Isolated From Cutaneous Fungal Infections: The Vietnamese Experience

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Abstract

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AIM: Evaluate the resistance of dermatophytes to systemic antifungal drugs in the Vietnamese population.

METHODS: We enrolled 101 patients with cutaneous dermatophytosis at the Dermato-Venereology hospital in HCMC from August 2016 to March 2017. All the specimens were subjected to direct examination (10% KOH mount) and culture on Sabouraud dextrose agar. In vitro antifungal sensitivity testing was done on species isolated from a culture with broth microdilution method.

RESULTS: Direct microscopy was positive for dermatophytes in all patients. However this pathogen was found in fungal cultures in only 61.38% of patients. The main causative agent isolated was *Trichophyton spp.* (90.3%), followed by *Microsporum spp.* (8%) and *Epidermophyton spp.* (1.7%). *Trichophyton spp.* Has shown resistance to fluconazole, griseofulvin, ketoconazole, and itraconazole in 92.9%, 46.4%, 5.4% and 1.8% of strains, respectively. All *Microsporum spp.* Strains were found resistant to fluconazole and griseofulvin while resistance to ketoconazole was demonstrated in only 20% of strains and none of them was resistant to itraconazole. *Epidermophyton spp.* strains were all resistant to fluconazole, griseofulvin, ketoconazole while none of them was resistant to itraconazole.

CONCLUSION: Based upon our results, Itraconazole shows the greatest probability of efficacy in the treatment of cutaneous dermatophytosis in Vietnamese patients.

Introduction

Dermatophytes are the most common cause of superficial cutaneous mycoses. *Dermatophytosis* are extremely frequent worldwide, affecting 20 – 25% of the global population [1], [2], [3]. *Dermatophytes* are divided into three genera: *Epidermophyton spp.*, *Trichophyton spp.*, and *Microsporum spp.* [2]. The treatment failure rate is increasingly encountered, leading to a prolonged or recurrent infectious status. Until now, studies on dermatophytes resistance to antifungal drugs have not been systemically performed in Vietnam.

Materials and Methods

Study population

This study was performed at the Dermato – Venereology hospital in HCMC where 101 patients with clinical signs and symptoms of dermatophytosis and positive direct wet method for dermatophytes by 10% KOH were enrolled, from August 2016 to March 2017.

Fungal identification and in-vitro antifungal sensitivity testing

Skin scrapings were collected from the edges of the lesions and transported immediately to the laboratory. All the specimens were subjected to direct examination by 10% KOH mount and culture on Sabouraud dextrose agar (SDA) for fungal determination, using MALDI – ToE technique. Antifungal sensitivity testing was done with Mueller – Hinton sterile agar plates separately containing itraconazole, fluconazole, griseofulvin and ketoconazole, at Mycological Department of Mycology of the Pham Ngoc Thach University of Medicine. Results of the antifungal susceptibility test were analysed according to the National Committee for Clinical Laboratory Standards (NCCLS).

Statistical analysis

Data were collected, tabulated, and analysed using SPSS version 16.0.

Results

Patients' mean age was 32.4 ± 16.7 ; males constituted 58.4% of participants.

Table 1: Fungal culture results from 101 patients with cutaneous dermatophytosis

| | N | Percentage |
|----------------------------|----|------------|
| <i>Trichophyton spp.</i> | 56 | 90.3% |
| <i>Microsporum spp.</i> | 5 | 8% |
| <i>Epidermophyton spp.</i> | 1 | 1.7% |

Clinical presentations consisted of itching (77.2%) usually in combination with scaly, well-defined, polygonal erythematous plaques. Culture results showed in Table 1 and Table 2.

Table 2: Identification of *Trichophyton spp.*

| <i>Trichophyton spp.</i> | N | Percentage |
|------------------------------------|----|------------|
| <i>Trichophyton rubrum</i> | 22 | 39.2% |
| <i>Trichophyton tonsurans</i> | 18 | 32.1% |
| <i>Trichophyton mentagrophytes</i> | 11 | 19.6% |
| <i>Trichophyton equinum</i> | 1 | 1.8% |
| <i>Trichophyton Sudanese</i> | 1 | 1.8% |
| <i>Trichophyton violaceum</i> | 2 | 3.6% |
| <i>Trichophyton schoenleinii</i> | 1 | 1.8% |
| Total | 56 | 100% |

Antifungal susceptibility of *Trichophyton spp.* Showed in Table 3.

Table 3: In vitro antifungal susceptibility testing for *Trichophyton spp.*

| Antifungal drugs | Sensitive (%) | Resistant (%) | Intermediate (%) |
|------------------|---------------|---------------|------------------|
| Itraconazole | 98.2 | 1.8 | 0 |
| Ketoconazole | 91.1 | 5.4 | 3.6 |
| Griseofulvin | 50.6 | 46.4 | 0 |
| Fluconazole | 5.4 | 92.9 | 1.8 |

All *Microsporum spp.* Strains were found resistant to fluconazole and griseofulvin while resistance to ketoconazole was demonstrated in only 20% of strains and none of them was resistant to itraconazole. *Epidermophyton spp.* strains were all resistant to fluconazole, griseofulvin, ketoconazole while none of them was resistant to itraconazole.

Discussion

In our study, KOH mount was positive in all patients (100%) whereas culture was positive with *dermatophytes* in only 62 patients (61.38%). Ilkit's study found 94% of positive direct microscopy and 76% of positive culture [4]. The positive culture rate in Silva's study was lower (45.3%) [5]. In the species of *dermatophytes* in this study as results of Teklebirhan, Rezaei – Matehkolaei and Chadeganipour, *Trichophyton spp* and *T. rubrum* accounted for the highest proportion in dermatophytosis [6], [7], [8], [9], [10].

Our study showed that *Trichophyton spp.* resisted to fluconazole (92.9%), griseofulvin (46.4%), ketoconazole (5.4%), and itraconazole (1.8%), *Microsporum spp.* resisted to fluconazole and griseofulvin (100%), ketoconazole (20%). Non of them had resistance to itraconazole. All the *Epidermophyton spp.* resisted to fluconazole, griseofulvin and ketoconazole. None of them had resistance to itraconazole. No similar data exist in the medical literature for comparison with our study.

In conclusion, *Trichophyton spp.* are the most common cause of cutaneous dermatophytic infections (90.3%). Itraconazole is recommended in the treatment of skin dermatophytosis because of its excellent sensitivity to almost dermatophytic species.

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