

## Comparative study between terbinafine and griseofulvin in dermatophytosis in children between 5 years to 15 years

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### Abstract

**Introduction:** Dermatophytosis is a superficial fungal infection of keratinized tissue. The infection is known as tinea. Various oral and topical antifungal agents used in clinical practice.

**Objective:** Comparative study between oral terbinafine and griseofulvin in dermatophytosis infection in children between 5 to 15 years

**Methods:** Patients of both gender and age between 5 to 15 years diagnosed as dermatophytic infection were enrolled for the study. A total of 100 patients were divided into two groups. One group was treated with oral terbinafine and other with oral griseofulvin for 4 weeks. In addition a placebo cream/ lotion was applied locally.

**Limitation:** Large studies are required for more confirmation.

**Conclusion:** Oral terbinafine produced 88 percent cure while cure with griseofulvin was 72 percent. Clinical response to oral terbinafine was 16 percent better. No significant adverse effects were noticed in either groups, except in some cases mild gastrointestinal disturbance.

**Keywords:** Dermatophytosis, Terbinafine, Griseofulvin, Tinea, Fungicidal.

### Introduction

Dermatophytes have been defined as keratinophilic organisms that have the ability to invade hair, nails, and the skin of the living host. Those species that do not invade hair, nail, or skin, but belong to the already mentioned genera are technically not dermatophytes.<sup>1</sup> The Dermatophytes represent 39 closely related species in three genera: *Microsporum*, *Trichophyton*, and *Epidermophyton* of *Deuteromycota* or *fungi imperfecti*.<sup>2</sup>

Depending on whether a species resides predominantly in the soil, on animals, or on humans, it is said to be geophilic, zoophilic, or anthropophilic, respectively.<sup>3</sup> Zoophilic fungi primarily infect higher animals, but can be transmitted to humans sporadically.<sup>4</sup> Anthropophilic infections are often epidemic in nature. The mode of transmission of infection is from humans either by direct contact or by fomites.<sup>5</sup>

Predisposing factors are underlying diseases such as diabetes mellitus, lymphomas<sup>6</sup> immunocompromised status,<sup>7</sup> or Cushing's syndrome,<sup>8</sup> which could produce severe, widespread, or recalcitrant dermatophytosis. Trauma, maceration, and increased hydration of skin make the inroad for pathogenic fungi. After the host skin has been inoculated under suitable conditions, the infection progresses through several stages: a period of incubation, a period of enlargement followed by a refractory period, and a stage of involution.<sup>9</sup>

During the incubation period the dermatophyte grows in the stratum corneum with minimal clinical signs of infection. Once the infection is established in the stratum corneum, two factors are important in

determining the size and duration of the lesion: the growth rate of the organism and the epidermal turnover rate. The fungal growth rate must either equal or exceed the epidermal turnover rate, as otherwise the organism will be shed quickly.<sup>10</sup>

There is an increased epidermal turnover at the inflammatory periphery of the lesion, whereas in other areas it is comparable to that of normal skin. This host inflammatory response and the increased epidermal turnover lead to shedding of the organisms at the inflammatory ring while those just ahead maintain the infection. The annular appearance of dermatophyte infection is compatible with the above observations.<sup>9</sup>

Defense against dermatophytes involves both immunological and nonimmunological mechanisms. Keratinocytes play an important structural role in forming a physical barrier against dermatophytes but also are important functionally by secreting proinflammatory cytokines, chemokines, and antimicrobial peptides.<sup>11</sup>

Various oral antifungal agents used in clinical practice among them both terbinafine and griseofulvin are well known systemic antifungal drugs whose role in treatment of dermatophytosis is quiet recognized. Terbinafine belongs to allylamine group and acts by inhibiting squalene monooxygenase enzyme thereby preventing ergosterol synthesis.<sup>12</sup> Ergosterol is an important constituent of cell membrane.<sup>13</sup> Due to its lipophilic nature it gets accumulated in skin and fat tissues. Griseofulvin, a fungistatic drug inhibits the microtubular synthesis of fungal cell membrane. It also inhibits nucleic acid synthesis in fungal cells.<sup>14</sup>

The incidence of dermatophytosis in children is increasing in recent time.<sup>15</sup> This study was undertaken to compare the relative efficacy between oral terbinafine and oral griseofulvin in dermatophytic infection in children.

### Materials and Methods

The study was carried out in a patients of dermatophytic infection who were attending dermatology outpatient department of L.L.R.M. Medical College Meerut from January 2018 to April 2018.

A total 100 patients (5 to 15 years) of dermatophytosis were selected for the study. In each case diagnosis was made clinically and confirmed by KOH examination. Random selection was done, 50 patients were kept on oral terbinafine and 50 were kept on oral griseofulvin according to their body weights.

Dose of terbinafine<sup>16</sup> [tinea corporis, tinea cruris, tinea pedis, tinea manuum]

< 20 kg – 62.5 mg

20-40 kg – 125 mg

> 40 kg – 250 mg

Dose of terbinafine [tinea capitis]

< 25 kg=125 mg /day

25-35 kg=187.5mg/day

>35kg=250 mg /day

Dose of griseofulvin (microsize) - 10-20mg /kg/day in divided dose<sup>17</sup>

[Maximum 1gm per day]

Each patient was followed up weekly. Any side effects, clinical response and mycological findings were recorded on each visit. On the basis of therapeutic response, improvement was graded as follows<sup>18</sup>

Grade 0: no improvement

Grade 1: persistence of few papular lesions or erythema with mild to moderate itching (subjective improvement noted)

Grade 2: scaly lesions with or without itching.

Grade 3: disappearance of original lesions with or without residual pigmentation.

At the end of 4 weeks final assessment was done.

### Results and Discussion

In each group, there were 50 cases which included tinea corporis (18), tinea capitis (08), tinea manuum (02), tinea faciei (08), mixed tinea (14). All cases were KOH positive.

**Table 1: Groups of dermatophytic infection (age 5 to 15 year)**

Type of infection	On oral Terbinafine	On oral griseofulvin	Total No
Tinea corporis	18	18	36
Tinea capitis	08	08	16
Tinea manuum	02	02	04
Tinea faciei	08	08	16
Mixed tinea	14	14	28
Total No	50	50	100

**Table 2: Response to treatment of both drugs (Terbinafine and Griseofulvin)**

Duration	Oral Terbinafine	Oral griseofulvin
Complete Cure upto 2 weeks	10 (20%)	00(0%)
Complete Cure upto 3 weeks	30(60%)	10(20%)
Complete Cure upto 4 weeks	04(8%)	26(52%)
Note Cured	06(12%)	14(28%)
Total No	50	50

**Table 3 Group disease status cross tabulation**

Group	Terbinafine	Count % within group	Disease status		Total
			Cured	Not cured	
	Terbinafine	Count % within group	44 88.0%	6 12.0%	50 100.0%
	Griseofulvin	Count % within group	36 72.0%	14 28.0%	50 100.0%
Total		Count % within group	80 80.0%	20 20.0%	100 100.0%

Table 4: Chi-square Tests

	Value	df	Asymp Sig (2-sided)	Exact sig (2-sided)	Exact sig (1-sided)
Pearson Chi-Square	4.000 <sup>a</sup>	1	.046		
Continuity Correction	3.062	1	.080		
Likelihood Ratio	4.093	1	.043		
Fisher's Exact Test				.078	.039
Linear-By-Linear Association	3.960	1	.047		
N of valid Cases <sup>b</sup>	100				

- a. O cells (.0%) have expected count less than 5 The minimum expected count is 10.00  
 b. Computed only for a 2x2 table

There was statistically significant difference in overall clinical cure rates in either of the groups. Terbinafine appeared better than griseofulvin in study cases.

No serious side effects were noted in either groups except in some cases mild gastro intestinal disturbance.

In this study 88 percent cure rate was found with terbinafine while in earlier study it was found to be 96 percent.<sup>19</sup> Cure rate for griseofulvin was 72percent in our study while in earlier studies by Hay et al<sup>20</sup> and Sharma et al,<sup>18</sup> it was found to be 74 percent and 76.7 percent respectively.

There are several aspects of superficial mycosis, where there is inadequate knowledge and demands more research. Susceptibility factors for dermatophyte and other mycoses are not clearly understood. Difficulties in working with dermatophytes are the poor virulence models and a lack of genetic tools.<sup>21</sup> A common animal model for studying dermatophyte virulence is guinea pig, but this does not provide accurate infection models for most anthropophilic species.<sup>22</sup> Human epidermal tissues are better models for early dermatophyte infection.<sup>21</sup> Recently there have been efforts in providing a foundation for genetic manipulation of several species of dermatophytes.<sup>23,24</sup> In the last several years, newer antifungal agents has come to treat dermatophytic infections, like terbinafine may give better results.

### Conclusion

The overall difference in clinical response was 16 percent which is statistically significant. Cost wise treatment of griseofulvin was economical. Terbinafine is more effective systemic antifungal in treating tinea infection in children.

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