

Effect of chronicity and treatment on *in vivo* morphology and density of dermatophytes

Sir,

There has been an alarming increase in the prevalence and change in clinical pattern of dermatophytoses over the past 4-5 years across India.¹ It is not clear if different clinical patterns of dermatophytosis are associated with any changes in fungal morphology.

We did a comparative cross sectional study in the Department of Dermatology, Government Medical College, Thrissur, Kerala to determine if there is any difference in the morphology of fungal hyphae and density of dermatophytes as seen on 10% potassium hydroxide (KOH) smear in different clinical types of tinea corporis and tinea cruris. Of the 143 consecutively attending patients, we selected 107 (74.8%) patients in whom dermatophytes could be demonstrated on KOH smear. They were divided into three groups: Group A (n = 32) consisting of patients who had received no prior antifungal therapy (naive cases), Group B (n = 51) consisting of patients who had used topical agents containing corticosteroids (n = 19); who had stopped antifungal therapy before the recommended duration (n = 12); or those with diabetes mellitus (n = 17); HIV (n = 1) or those on systemic immunosuppressants (n = 2) and Group C (n = 24) consisting of patients who had persistent infection despite taking antifungal therapy (systemic/topical) at the recommended dose and duration [defined as: tab fluconazole 150mg once or twice weekly for a minimum of 4 weeks, tab terbinafine 250mg per day for 2-4 weeks, tab itraconazole 100mg twice daily for 2- 4 weeks and tab griseofulvin 250-500 mg twice daily for 2-4 weeks].

The KOH positive smears were further examined using a binocular microscope with an ocular micrometre to assess the

width of the hyphae. Each small division of the micrometer corresponded to 2.5 micrometre.

Density of hyphae and spores were also assessed and graded as follows:

Scanty = 1-10 hyphae or spores per 10 fields;

Mild = 1-10 hyphae or spores in every field;

Moderate = >10, but countable number of hyphae or spores/field;

Abundant = uncountable hyphae or spores in a field

If only spores were present, their density was graded as follows:

Few = 1- 10;

Moderate = >10, but countable;

Abundant – uncountable

Age of the patients ranged from 8-70 years (mean = 36.13 ± 16.9). Females outnumbered males (67:40). Seventy three [68.2%] patients had lesions involving more than 10% of body surface area. Papulosquamous was the most common [n = 73; 62.8%] morphological type.

Forty eight (n = 48; 44.9%) patients had scanty and 48 (44.9%) had moderate density of hyphae on KOH smear. Though the

Table 1: Hyphal density, density of spores and width of fungal hyphae on 10% potassium hydroxide smear inpatients with tinea corporis or cruris

Group	Hyphal density				Density of spores				Width of fungal hyphae		Total, n (%)
	Scanty, n (%)	Mild, n (%)	Moderate, n (%)	Abundant, n (%)	Nil, n (%)	Mild, n (%)	Moderate, n (%)	Abundant, n (%)	Normal (<2.5 micrometre), n (%)	Broader (>2.5 micrometre), n (%)	
A	16 (50)	4 (12.5)	11 (34.4)	1 (3.1)	1 (3.1)	22 (68.7)	9 (28.2)	0 (0)	32 (100)	0 (0)	32 (100)
B	21 (41.2)	4 (7.8)	22 (43.3)	4 (7.7)	0 (0)	31 (60.8)	19 (37.3)	1 (1.9)	37 (72.5)	14 (27.5)	51 (100)
C	11 (45.8)	2 (8.4)	11 (45.8)	0	0 (0)	17 (70.8)	7 (29.2)	0 (0)	23 (95.8)	1 (4.2)	24 (100)
Total	48	10	44	5	1	70	35	1	92	15	107

Group A: Patients who had received no prior antifungal therapy, Group B: Improperly treated cases or those with diabetes mellitus, HIV or those on systemic immunosuppressants, Group C: Patients with persistent infection despite taking adequate antifungal therapy (systemic/topical)

density of hyphae was slightly more in Groups B and C, the difference was not statistically significant [$P = 0.71$] [Table 1]. The density of spores was low in the majority ($n = 70$; 65.4%) of patients and was not significantly different among three groups ($P = 0.624$). Hyphal thickness measured under ocular microscope was less than 2.5 micrometre in the majority of patients ($n = 56$; 52.3%). Broader hyphae (width more than 2.5 micrometre) was more frequent in Group B, compared to the other two groups ($P = 0.001$). Among the 15 patients in whom we identified an increased hyphal width, 14 (93.3%) belonged to group B.

Increased density of fungal hyphae has been described in dermatophytosis in the presence of immunosuppression,² though our study did not support that. The notable finding in our study was the increased fungal width and not increased density of fungal hyphae in cases which were improperly treated particularly with corticosteroids, or those with underlying diabetes mellitus or immunosuppression. Environmental, host and fungal factors can influence growth of dermatophytes.^{3,4} External agents can affect the rate of growth of dermatophytes and result in changes in the morphology of hyphae.⁵ Application of topical corticosteroids have been shown to decrease the level of free fatty acids and cholesterol and ceramides, impair the barrier function of skin and result in epidermal atrophy and xerosis.⁶

The limitations of our study include the cross sectional design, selection bias due to hospital based recruitment of cases, lack of a prior sample size calculation and limited precision of the instrument. Studies with case control design may be undertaken with sample size calculated based on our findings in future. The effect of corticosteroids on fungi grown in culture may be studied. Studies exploring the mechanism by which topical or systemic immunosuppression cause increased hyphal width also may be undertaken.

Declaration of patient consent

The authors certify that they have obtained all appropriate

patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Acknowledgment

We thank Mrs Subi T, lab technician for her assistance in evaluating the fungal width and density of spores and hyphae.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

**Gopika Sunil, K. Devi¹, Betsy Ambooken,
Neelakandhan Asokan**

Department of Dermatology, Government Medical College, Thrissur,
¹Department of Dermatology, Government Medical College, Kozhikode,
Kerala, India

Correspondence: Dr. K. Devi,
Department of Dermatology, Government Medical College,
Kozhikode, Kerala, India.
E-mail: drdevi64@gmail.com

References

1. Panda S, Verma S. The menace of dermatophytosis in India: The evidence that we need. *Indian J Dermatol Venereol Leprol* 2017;83:281-4.
2. Piérard GE, Piérard-Franchimont C, Hermanns-Lê T, Hermanns JF, Delvenne P. Dermatophyte growth in glabrous skin dermatophytosis of immunocompromised hosts. *J Med Diagn Methods* 2015;4:186.
3. Esquenazi D, Alviano CS, de Souza W, Rozental S. The influence of surface carbohydrates during *in vitro* infection of mammalian cells by the dermatophyte *Trichophyton rubrum*. *Res Microbiol* 2004;155:144-53.
4. Ninomiya J, Ide M, Ito Y, Takiuchi I. Experimental penetration of *Trichophyton mentagrophytes* into human stratum corneum.

- Mycopathologia 1998;141:153-7.
5. Ghahfarokhi MS, Goodarzi M, Abyaneh MR, Al-Tiraihi T, Seyedipour G. Morphological evidences for onion-induced growth inhibition of *Trichophyton rubrum* and *Trichophyton mentagrophytes*. *Fitoterapia* 2004;75:645-55.
 6. Del Rosso JQ, Cash K. Topical corticosteroid application and the structural and functional integrity of the epidermal barrier. *J Clin Aesthet Dermatol* 2013;6:20-7.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code:	Website: www.ijdv1.com
	DOI: 10.4103/ijdv1.IJDVL_155_20

How to cite this article: Sunil G, Devi K, Ambooken B, Asokan N. Effect of chronicity and treatment on *in vivo* morphology and density of dermatophytes. *Indian J Dermatol Venereol Leprol* 2020;86:736-8.

Received: February, 2020. **Accepted:** June, 2020.

© 2020 Indian Journal of Dermatology, Venereology, and Leprology | Published by Wolters Kluwer - Medknow