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Original Article

Clothing habits and chronicity of dermatophytosis: Bridging the gap

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Abstract

Background Chronic and recurrent dermatophytic infections cause significant distress to the patients. The causal relationship of clothing in these patients remains underscored. The present study highlights the effect of clothing in causing multiple recurrences among Chronic Dermatophytosis patients.

Methods Patients of chronic recurrent dermatophytosis were enrolled from dermatology OPD and divided into Group I & II, each having patients with less than three & more than three recurrences during the last 6 months respectively. Each group was further divided into three subgroups i.e. Group A, B & C comprising of patients affected with tinea cruris, tinea corporis and both i.e. tinea cruris et corporis respectively. All groups were evaluated in reference to various clothing habits i.e. Type and material of cloth, Frequency of washing clothes, Separate washing of infected clothes, washing, drying and ironing of clothes along with the use of "V" shape inner garments.

Results Comparative evaluation of tinea corporis patients in Group I & II in relation to clothes washed in hot or cold water revealed 73% in Group I & 25% patients in Group II were washing their clothes in hot water while the rest were washing them in cold water. The data was statistically significant.

Conclusion Clothing habits can be a confounding factor in multiple recurrences of Dermatophytosis and washing clothes in hot water can prevent multiple recurrences of tinea corporis.

Key words
Clothing habits, recurrent dermatophytosis, chronic dermatophytosis, hot and cold water.

Introduction

Superficial fungal infections of the skin, hair, and nail are among the most common infective dermatoses seen in dermatology outpatient clinics. Today, we are facing an onslaught of chronic and recurrent dermatophytosis in volumes rarely seen before. Over the last 3–4 years, the frequency of such cases has increased alarmingly. Chronic and recurrent dermatophytic infections cause significant distress to the patients socially, emotionally and financially. There is no standard definition for the term "chronic dermatophytosis". In our terms, it is defined as "patients who have suffered from the disease for more than 6 months to 1-year with or without recurrence, inspite of being treated." Recurrent dermatophytosis refers to the reoccurrence of the dermatophyte infection within a few weeks after completion of treatment.[1,2] The patho-mechanisms for chronic/recurrent dermatophytic infections are not well understood. The chronicity could be secondary to host, agent, environmental, or

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pharmacologic factors. About 90% of cases of chronic dermatophytosis have been attributed to Trichophyton rubrum infection.[3] Widespread T. rubrum dermatophytosis has often been described as T. rubrum syndrome, Generalized chronically persistent Rubrophytia, and Tinea corporis Generalisata.[4] The clothing habits may act as an integral confounding factor of the epidemiological triad in pathogenesis of dermatophytosis.

The use of tight clothing, occlusive footwear has been attributed to dermatophytosis.[5] But an etiological role of these clothing habits has always been overshadowed by the other commonly known factors of chronic recurrent dermatophytosis. In this background of recurrent dermatophytosis, this study was conducted to evaluate the role of clothing habits as a confounding factor in multiple recurrences of Chronic Dermatophytosis.

Methods

The present study was conducted after receiving approval from the institutional ethics committee. After clinical diagnosis and microscopic confirmation by KOH examination, patients of chronic recurrent dermatophytosis attending the Dermatology OPD were enrolled in the study from a period of 8th February, 2018 to 23rd February, 2018. Patients with a minimum of two episodes of dermatophytosis in last six months irrespective of their immune status or history of drug intake were included in the study. Patients receiving antifungals in the past two weeks or a single episode of dermatophytosis in the past 6 months were excluded.

The patients were divided into two groups, I & II, each having patients with less than three & more than three recurrences during the last six months respectively. Each group was further divided into three subgroups i.e. Group A, B & C comprising of patients affected with tinea cruris, tinea corporis and both tinea cruris et tinea corporis, respectively. Each of these groups was evaluated in reference to various parameters i.e. type of cloth, material of cloth, frequency of washing clothes, separate washing of infected clothes, clothes washed in (hot or cold water), Clothes dried in (sunlight or indoors), habit of ironing clothes and use of “V" shape inner garments. The data were tabulated and statistical analysis was done using the Chi-Square Test.

Results

Out of a total of 72 patients (22 males & 50 females), 41(57%) were in Group I & 31(43%) in Group II **(Figure 1)**. The maximum number of patients were comprised of tinea cruris et corporis 43% (31/72), tinea corporis included 38% (27/72) while the least number of patients were affected by tinea cruris 19%(14/72) **(Figure 2)**. The gender distribution of patients in Group I showed that the maximum number of patients were females i.e. 68% (28/41) which were mostly affected by tinea cruris et corporis 42% (12/28) while most of the males were affected by tinea corporis 46% (6/13). The least number of males 14% (2/13) and females 25% (7/28) were affected by tinea cruris **(Figure 3)**.

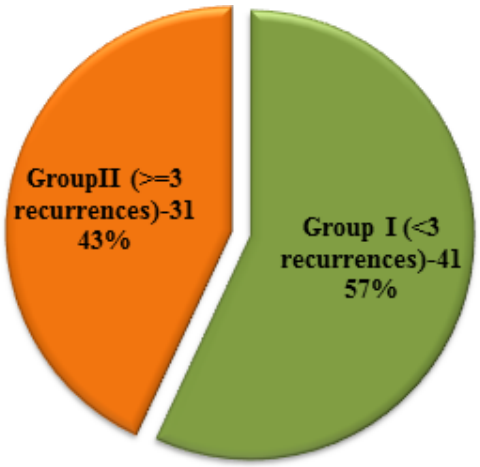

Figure 1 Distribution of total patients in each Group

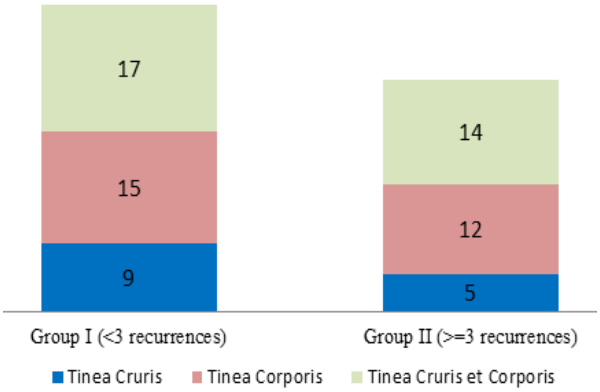

Figure 2 Distribution of each subgroup in both the Groups I & II

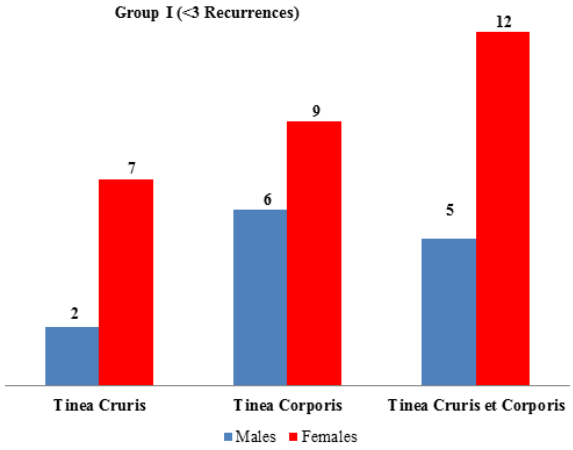

Figure 3 Gender distribution in each subgroup of Group I patients

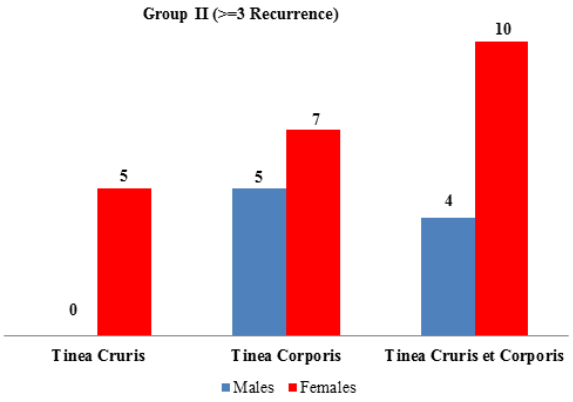

Figure 4 Gender distribution in each subgroup of Group II patients

Similarly in Group II, majority of patients were females 70% (22/31) which were mostly suffering from tinea cruris et corporis 45% (10/22) while most of the males were having tinea corporis 55% (5/9) and none of the males 0%(0/9) were having tinea cruris **(Figure 4)**.

In Group I, tight 55% (5/9) and synthetic clothes 89% (8/9) were mainly used by patients of Group A as compared to the other subgroups. Majority of patients in all three subgroups were washing their clothes on alternate days but daily washing was seen more commonly among Group A 33%(3/9), alternate day washing was frequent among Group B 67% (10/15) and habit of weekly washing of clothes among patients of Group C 24% (4/17).

Likewise, most of the patients in all the three subgroups were washing their infected clothes separately but it was more common among patients of Group C. Although a large number of patients in all the three subgroups were using V shape inner garments and were in a habit of washing clothes in hot water, drying them in sunlight and ironing them but all these habits were more frequent among patients of Group C **(Table 1)**.

In Group II, Tight clothing was more common in Group A while synthetic clothing was more frequently used by patients of Group C. Majority of the patients were washing their clothes on alternate days and the habit of daily washing the clothes was least common among Group A patients. Separate washing of infected clothes and the use of hot water was more common among Group C patients. The habit of drying and ironing the clothes was more common in Group A while the use of "V" shape inner garments was more frequent among patients of Group C **(Table 2)**.

The comparative evaluation of tinea corporis (Group B) patients in Group I & II in relation to clothes washed in hot or cold water revealed that

Table 1 Clothing habits in Group I

Clothing habits	*Tinea Cruris Group A (n=9)*	*Tinea corporis Group B (n=15)*	*Both (Tinea Cruris et Corporis) Group C (n=17)*
Type of cloth			
Tight	5	6	8
Loose	4	9	9
Material of cloth			
Cotton	1	5	5
Synthetic	8	10	12
Frequency of washing clothes			
Daily	3	2	3
Alternate days	4	10	10
Weekly	2	3	4
Separate washing of infected clothes			
Yes	4	3	8
No	5	12	9
Clothes washed in			
Hot water	6	11	15
Cold water	3	4	2
Clothes dried in			
Sunlight	7	11	15
Indoors	2	4	2
Habit of ironing clothes			
Yes	9	10	14
No	0	5	3
Use of "V" shape inner garments			
Yes	7	11	15
No	2	4	2

11 out of 15 patients in Group I (73%) & 3 out of 12 patients in Group II (25%) were washing their clothes in hot water and the rest were washing them in cold water. On comparison, the data was found to be statistically significant ($p<0.05$).

Discussion

The previous studies conducted over the subject have focused over the virulence of the fungal species[6-10], immune status of the host[1,2], resistance to drugs[11] & socioeconomic factors[12] as the main cause of chronic dermatophytosis.

Clothing has always been regarded as an aggravating factor in the recurrences and objects such as clothing, bed sheets and towels harbor the fungal pathogens and are capable of transmitting the disease among family members.[13,14]

The studies conducted in reference to clothing habits are lacking. In a cross-sectional study conducted by Pathania S *et al*. (2018), it was found that about a third of the patients were using tight clothes, 15% patients washed their clothes separately which were infrequently washed.[15] In our study more than half of the patients i.e. 52.7% (38/72) were using tight

Table 2 Clothing habits in Group II

Clothing habits	*Tinea Cruris Group A (n=5)*	*Tinea corporis Group B (n=12)*	*Both(Tinea Cruris et Corporis)Group C (n=14)*
Type of cloth			
Tight	5	6	8
Loose	0	6	6
Material of cloth			
Cotton	3	6	4
Synthetic	2	6	10
Frequency of washing clothes			
Daily	0	3	4
Alternate days	5	6	9
Weekly	0	3	1
Separate washing of infected clothes			
Yes	2	4	7
No	3	8	7
Clothes washed in -			
Hot water	3	3	12
Cold water	2	9	2
Clothes dried in			
Sunlight	4	9	11
Indoors	1	3	3
Habit of ironing clothes			
Yes	5	8	12
No	0	4	2
Use of "V" shape inner garments			
Yes	3	8	10
No	2	4	4

clothes and among these tight clothing was more frequently used in patients of Group II i.e. 61.2% (19/31) as compared to Group I with 46.34% (19/41) patients. The results were statistically insignificant although ($p>0.05$). Additionally, 38.8% (28/72) of patients were separately washing their clothes. This variation in both the parameters may be attributed to the short sample size of enrolled cases. Apart from these two risk factors, the other parameters were not comparable with the above-mentioned study and have not been studied in any other study.

This study also depicts that the patients of tinea corporis who were washing their clothes in hot water were found to have less number of recurrences to those washing in cold water. Thus, washing clothes in hot water can be a mode of prevention against multiple recurrences of tinea corporis. It has been emphasized in a study that washing clothes in hot water and sunning them is beneficial as sunlight destroys dermatophytes but quantification of these variables in terms of aetiology was not highlighted.[16] A study conducted by LORINCZ AL and Sun SH (1963 demonstrated that in Sabouraud's liquid shake culture preparations inocula of 24 strains of dermatophytes failed to grow after exposures for one week to temperatures ranging from 39 to 43 C. In many cases exposure to 43 C for only 5½ hours completely inhibited established inocula in such preparations.[17] In our study, no such well-defined limits were made for deciding the temperature of hot or cold water.

The present study has been more revealing in the context of clothing habits where each of the habits have been depicted in reference to the patients of tinea cruris, tinea corporis and tinea

cruris et corporis. The study also depicts some other factors like drying and ironing of clothes which have not been taken into account in any study.

The study was mainly limited by number of subjects, lack of a control group, and lack of specifications for hot and cold water and non-exclusion of immunocompromised and drug-resistant subjects.

To conclude, apart from the management approaches mainly concerned with drug resistance & immune status of the host, clothing habits are likely to play a role in the multiple recurrences of dermatophytosis. Therefore, further studies with larger sample size and exclusion of other etiologic factors should be undertaken so that the underestimated role of clothing in recurrent dermatophytosis can be more understood and holistic management of this new epidemic of dermatophytosis can be provided to the patients.

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