Epidemiology of dermatophyte infection. *Comparison of clinical and mycological findings*

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Dermatophytes constitute a group of well recognized superficial fungal infections which are very common and are on the increase due to factors such as immuno-suppressed host status, excessive misuse of systemic/local corticosteroids, environmental pollution, and poor hygienic conditions specially in the under developed world. To date we still do not have any biochemical or serological set up for species identification. The aim of this study was to diagnose cases with dermatophyte infections clinically and compare the clinical findings with mycological investigative procedures such as direct microscopic examination and growth on specific culture mediums to gain a proper view of the incidence of the various types of the dermatophyte infections.

This case controlled prospective study was carried out for a period of one year from July 2001 until August 2002 in Mayo Hospital Lahore, Pakistan. Patients with suspected fungal infections were referred mostly from dermatology and various other units of the hospital. The material used for the study was scraping of skin, hair and nail clippings, which were examined directly with 20% potassium hydroxide (KOH) solution and used for culture medium inoculation. Commercially available Sabouraud dextrose agar (Difco) manufactured by Upjohn Co., Kalamazoo, Michigan was used. The medium alone and with antibiotic was used. The dermatophyte test medium (DTM) used was from DIFCO laboratories, Detroit, Michigan. Samples from each patient were inoculated on 2 Petri dishes of Sabouraud's media, one with and another without antibiotic and incubated at 22-28°C. Samples inoculated in DTM bottles were incubated at room temperature. The growth in the control and experimental plates were rated daily for 21 days. False positive results were carefully omitted.

During this study 270 cases suspected of fungal infections were studied. Out of these, 220 were positive for fungus by direct microscopy in KOH. Of these 220 cases 191 (87%) gave a growth on culture also. Scrapings from 50 cases that had shown negative results on KOH direct examination, 6 (12%) grew on culture media. Hence out of the total 270 clinically suspected cases, 197 (72.9%) cases were positive for culture growth. Incidence of *Tinea corporis* was highest (31.5%), followed by *Tinea capitis* (19.6%), and *Tinea cruris et corporis* (19.3%). The incidence of *Tinea unguium* and *Tinea pedis* was (7%), followed by *Tinea barbae* (1.5%). *Tinea corporis* was mostly seen in the age group 16-30 years, while *Tinea capitis* was seen in the age group 0-15 years. *Tinea pedis* was common between 16-45 years, while *Tinea unguium* and *Tinea manuum* belonged to age group 16-30 years.

Correlating the clinical and mycological data, it appears that the main organism isolated was *Trichophyton rubrum*, next in frequency was *Trichophyton violaceum*, *Trichophyton mentagrophytes*, *Trichophyton tonsurans*, *Epidermophyton floccosum* and *Microsporum gypseum* being the least (**Table 1**). From the results in this study in relation to age, it is quite clear that most of the patients both males and females belonged to the age group 16-30, age group 0-15 had the second highest number of cases in both the genders, followed by patients in the middle age group between 31-45 years. Interestingly patients in the older age group, namely, 61 and above were the least. The present study showed that males were more commonly affected than females. Similar findings have been reported in the past.[1] In the present study the results showed that *Tinea corporis* infection was the most common (31.5%) predominantly in males, the results being in conformity with those presented in previous studies.[2] Next in frequency was *Tinea capitis* (19.6%) with predominance in males, most of the cases in the age group (0-15 years). Several workers have reported *Tinea capitis* as second common infection in their studies.[2,3] In the present study incidence of *Tinea pedis* was (7%), 10 females and 9 males, the results being somewhat similar to those shown by Khan and Hafiz.[4]

Trichophyton rubrum was the most common type of organism seen in this study, these results are similar to those reported in the past.[2] The different dermatophytes isolated were grouped according to their adoptive pattern. It was found that there was 4 anthropophilic type, namely, *Trichophyton rubrum*, *Trichophyton violaceum*, *Trichophyton tonsurans* and *Epidermophyton-floccosum*, 2 zoophilic types, namely, *Trichophyton mentagrophytes* and *Microsporum canis* and one geophilic type, namely, *Microsporum gypseum* (**Table 1**). Surprisingly in the present study mostly anthropophilic species of fungus were isolated, although people of Punjab are mostly farmers and even if they are not, they have frequent contact with animals. Somewhat similar results were found with predominance of anthropophilic infections in research studies carried

Table 1 - Correlation between clinical and mycological study.

Dermatophytes	*T. corporis*	*T. capitis*	*T.cruris et corporis*	*T. pedis*	*T. unguim*	*T. manuum*	*T. cruris*	*T. barbae*	*T.corporis et unguim manuum, pedis*	Total
T.rubrum	39	29	27	6	2	4	-	-	5	**112**
T.mentagrophyte	6	2	9	1	-	-	-	2	-	**20**
T.violaceum	8	12	-	6	-	3	3	1	-	**33**
T.tonsurans	4	1	1	-	-	-	-	-	1	**7**
M.gypseum	1	-	1	-	-	-	-	-	-	**2**
M.canis	-	1	-	-	-	-	-	-	-	**1**
E.floccosum	3	-	4	2	1	2	10	-	-	**22**
Total (%)	**61 (31.1)**	**45 (22.9)**	**42 (21.3)**	**15 (7.6)**	**3 (1.5)**	**9 (4.6)**	**13 (6.6)**	**3 (1.5)**	**6 (3)**	**197**

T.rubrum - Trichophyton rubrum, T.mentagrophyte - Trichophyton mentagrophytes, T.violaceum - Trichophyton violaceum, T.tonsurans - Trichophyton tonsurans, M.gypseum - Microsporum gypseum, M.canis - Microsporum canis, E.floccosum - Epidermophyton floccosum, T.corporis - Tinea corporis, T.capitis - Tinea capitis, T.cruris et corporis - Tinea cruris et corporis, T.pedis - Tinea pedis, T.unguim - Tinea unguium, T.manuum - Tinea manuum, T.cruris - Tinea cruris, T.barbae - Tinea barbae.

out on dermatophytes in the past.[3,4] Out of 270 cases suspected of infection, 220 were positive for fungus by direct microscopy in KOH. Mehta et al[5] showed that in those cases which were positive on direct KOH examination, 72.88% grew on culture whereas for the cases which were negative on direct KOH examination, only 4.34 % grew on culture media. These results suggest that KOH examination, although a useful screening test, is not sufficient alone for making the diagnosis of dermatophyte. Some workers suggested in the past that definitive diagnosis of superficial fungal infections is made by examining scrapings in KOH and culture on Sabouraud's or Littleman's medium.[5] Keeping in view the past experiences and results from our study it would be suggestive to perform isolation on at least 2 culture media in addition to direct KOH examination to substantiate the clinical diagnosis in different scientific studies for proper out-patient management in hospitals. For this purpose DTM medium could be used which has been reported to give good and reliable results in other studies in the past. It also contains antibiotics to limit contamination by bacteria and many saprophytes which facilitate the identification of fungi in the office laboratory.[6]

To understand the unique nature of the host parasite relationship, surveillance of fungal diseases is essential to improve our understanding of their epidemiology and to enable research and prevention efforts to be prioritized. It is thus, important to develop more accurate and timely diagnostic tests for better understanding of these infections.

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