

The changing patterns of dermatomycoses in Sri Lanka

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Abstract

The incidence and distribution of dermatomycoses is of importance since it may reflect the climatic conditions, the genetic disposition of the people and also their customs. It is observed that the types of superficial fungal infections (SFI) present their anatomical distribution and the infecting fungal species, all differ from country to country. It is also likely that these parameters change from time to time even within the same country.

The present study deals with the superficial fungal infections encountered in Sri Lanka during the two five year periods, 1974-78 and 1990-94. Particular attention is paid to the dermatophyte fungi, the lesions produced by them, and the changing trends in the infecting fungal species.

Nine different types of superficial fungal infections were observed. Of these, ringworm infections caused by the dermatophyte fungi were the most prevalent. During the two periods under study there were distinct changes observed both in the anatomical distribution of dermatophyte infections and also in the infecting fungal species.

During both periods under study, anatomically tinea corporis was the most prevalent and accounted for the bulk of ringworm infections as opposed to the West and even neighboring India.

The proportion of infections of the feet increased significantly from 1% to 12%. Tinea capitis showed a marginal increase from 1% to 6% while *T. corporis* and *T. cruris* were reduced from 69% to 62% and from 29% to 19% respectively. Tinea capitis was of low preva-

lence in our community compared to other developing countries. Improved socio-economic conditions and a shift to the habit of wearing shoes may account for the increase in tinea pedis infections in our community.

Introduction

Cutaneous fungal infections in man include a wide variety of diseases in which the skin and its appendages are involved and are generally confined to the nonliving keratinous layers. However, a variety of pathological changes occur in the host because of the presence of these fungi and their metabolic products. Dermatomycoses are of worldwide distribution. They are probably most prevalent in developing countries where they constitute a great public health problem.

In Sri Lanka too in keeping with global trends superficial fungal infections (SFI) account for a major component of skin infections seen in our population. The majority of these infections are caused by a group of keratinophilic fungi collectively known as the dermatophytes. The term "dermatophyte" literally mean, "skin plants". These fungi are distinctive in that they are able to attack the non-viable keratin layers of the skin, hair and nails.

Dermatophytoses, or diseases caused by dermatophytes, are caused by fungi of three genera, namely, *Trichophyton*, *Microsporum* and *Epidermophyton*. The dermatophyte fungi are broadly divided into anthropophylic, zoophilic or geophilic fungi depending on whether the natural habitat is man, animal or soil. The severity of disease caused by these fungi depends on a number of factors such as the strain of fungus involved, and the immune status of the host and the environmental factors.

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Certain dermatophytes are geographically limited while others have a worldwide distribution. For instance, the species *M. ferruginium* is found in Japan, *T. soudanense* in central and West Africa while *T. rubrum* has a world-wide distribution. Infections by *Trichophyton yaoundei*, a distinct fungal species which was originally described in West Africa was recognized as a causal agent of tinea capitis in Cameroon, Zaire and Mozambique.

The incidence of this group of infections in a community is of importance as it may reflect climatic conditions, the genetic predisposition of the people and also their customs. It is also known that the prevalence and the pattern of dermatomycoses differ from country to country. Even in the same locality there is evidence that the pattern of dermatophytosis is likely to change at different periods of time.

It was felt important to study any changing trends in these infections in Sri Lanka. A study of dermatomycoses carried out in the five-year period 1974-1978 showed a distinct pattern of disease. To study changes in trends a similar study was carried out during the five-year period 1990-1994. This paper aims to highlight some changing patterns of the infections of skin, hair and nails caused by fungi during these two periods.

Patients and methods

Patients included were those referred to the Mycology division of the Medical Research Institute in Colombo, from the skin clinic of the general hospital, Colombo, the Colombo South hospital at Kalubowila, other public and private institutions and by general practitioners. Approximately 80% of patients in both studies were referred from the skin clinics in Colombo.

The Mycology division of the Medical Research Institute, Colombo is the reference centre for investigation of fungal infections in Sri Lanka and patients or material for investigations are referred from many parts of the country.

The pathologic materials, skin scales and hair were examined microscopically after treatment with 20% potassium hydroxide. Cultures were also performed in Sabouraud glucose agar with added cycloheximide and chloramphenicol. The infecting species identified using accepted criteria¹.

Results and discussion

During the period 1974 to 1978, it was possible to determine seven different types of SFI in Sri Lanka. Tinea or ring worm infections accounted for 34% of these infections. The other infections encountered during this period were, tinea versicolor (35%), candidiasis (23%), onychomycosis (6%), piedra (1.3%), erythrasma (0.6%), and trichomycosis axillaris (0.3%).

Of this tinea versicolor, candidiasis, and ringworm infections accounted for the bulk of superficial fungal infections. Erythrasma was found rarely and was observed mainly in the groins and feet notably in the web spaces. Onychomycosis or infection of the nail was fairly common and the fungi responsible were mainly the dermatophytes, and *Candida* species. A small proportion of infections by non-dermatophyte species such as *Aspergillus* species, *Fusarium* species, and *Scopulariopsis brevicaulis* were also seen². Piedra and trichomycosis axillaris are infections that affect the hair shaft only and were observed in a small number of patients. During the latter period two more types of SFI namely, tinea nigra and pitted keratolysis were observed in small numbers.

Tinea versicolor is highly prevalent in this country but very few patients seek treatment because it is not considered a "disease". In the olden days it was even considered a mark of beauty! And according to Aldo Castellani, the girls who had these spots on their faces were considered beautiful! these beauty spots were known as "Gomara" which translated means "tears of liquid gold"³.

Anatomical distribution (Table 1)

Conventionally, tinea infections are classified according to the anatomical distribution of the lesions. As such tinea corporis included lesions on the face, arms, legs, face and axilla. T. cruris, lesions in the groin area and tinea capitis described lesions of scalp and hair.

The anatomical distribution as well as the infecting fungal species showed a distinct pattern for Sri Lanka. In the 1974-78 series, there was a high incidence of tinea corporis (69%). Tinea cruris was present in 29% of infections. A very low incidence of tinea pedis (1.2%) was quite different from that seen in the west where tinea pedis forms the bulk of ringworm infections^{4,5,6}. This very low incidence of tinea pedis or foot infections may be due to the fact that the majority of our people either walk barefoot or wear open sandals. In the above study tinea pedis was present exclusively among the more affluent that wore shoes. In contrast, in the Indian subcontinent, tinea pedis was low in incidence but there was high incidence of tinea capitis, which could be as high as 63%⁷.

Table 1. The anatomical distribution of tinea infections (1974-1978)

Site	1974	1975	1976	1977	1978	Total
<i>Tinea corporis</i>	191	171	89	73	170	644 (69%)
<i>Tinea cruris</i>	62	50	41	35	85	273 (29%)
<i>Tinea capitis</i>	01	04	03	0	03	11 (01%)
<i>Tinea pedis</i>	03	05	01	0	02	11 (01%)
Total	257	230	134	108	260	939

Tale 2. Changing trends in anatomical distribution

Site	1974-1978	1990-1994
<i>Tinea corporis</i>	644 (69%)	796 (62%)
<i>Tinea cruris</i>	273 (29%)	249 (19%)
<i>Tinea capitis</i>	11 (01%)	80 (06%)
<i>Tinea pedis</i>	11 (01%)	158 (12%)
Total	939	1283

Table 3. Dermatophyte fungi isolated in culture 1974-78

	1974	1975	1976	1977	1978	Total
<i>T. rubrum</i>	215	125	103	88	206	739
<i>T. mentagrophytes</i> (our granulare)	15	16	15	13	19	78
<i>T. mentagrophytes</i> (our interdig)	2	1	0	0	0	3
<i>E. floccosum</i>	12	17	5	5	30	69
<i>M. gypseum</i>	15	18	8	2	3	46
<i>M. Canis</i>	1	2	0	0	1	4
<i>T. simii</i>	0	0	0	0	2	2
<i>T. verrucosum</i>	0	1	1	0	1	3
<i>T. concentricum</i>	0	2	0	0	0	2

Table 4. Dermatophyte fungi isolated in culture 1990-1994

	1990	1991	1992	1993	1994	Total
<i>T. rubrum</i>	42	41	18	50	68	219 (52%)
<i>T. mentag</i> (granular)	8	8	8	16	17	57 (14%)
<i>T. menta</i> (interdigital)	2	1	0	0	3	3 (3%)
<i>E. floccosum</i>	6	14	6	7	26	59 (14%)
<i>M. gypseum</i>	14	8	1	7	15	45 (11%)
<i>M. Canis</i>	0	0	0	1	1	2 (0.5%)
<i>T. simii</i>	3	2	1	0	1	7 (2%)
<i>T. violaceum</i>	0	2	0	0	0	2 (0.5%)
<i>Trichyphyton</i>	0	0	0	10	13	124 (6%)
Total	75	76	44	94	129	418

Table 5. Changing trends in the infecting species

	1974-1978	1990-1994
<i>T. rubrum</i>	739	219 (52%)
<i>T. mentagrophytes</i> (var granulare)	78	57 (14%)
<i>T. mentagrophytes</i> (var interdig)	3	3 (3%)
<i>E. floccosum</i>	69	59 (14%)
<i>M. gypseum</i>	46	45 (11%)
<i>M. Canis</i>	4	2 (0.5%)
<i>T. simii</i>	2	7 (2%)
<i>T. verucosum</i>	3	3
<i>T. concentricum</i>	2	0
<i>Trichyphyton</i> (Including <i>T. Tonsurans</i>)	0	24
Total culture positive	391	421

A special feature of the Sri Lankan situation was that the infections on the body surface were more inflammatory and widespread. It was also observed that tinea infections involving the waist area were seen frequently in women. Clothes such as the loin cloth, and the saree which are worn to produce a constricting effect around the waist area may lead to accumulation of sweat, and minor abrasions which may contribute to an increased risk of colonization by fungi. Tinea capitis also recorded a low of 1.2% during the period of this study. In a separate study covering ten years⁸ this low incidence of tinea capitis was confirmed. In contrast, 47.8% of superficial fungal infections in Kuwait⁹, 38% in Jordan¹⁰, 25% in Italy¹¹ and 20% in Libya¹² were of tinea capitis.

This low incidence may be due to:

1. The habit of frequent head baths by adults as well as children as a routine even in the poorest of families.

2. The distinct species of fungi such as *Microsporum audouinii*, *Tricophyton soudanensis* which cause epidemics of tinea capitis in other countries are not found in this country.
3. Coconut oil used widely among the rural people of Sri Lanka may have an antifungal effect. The antifungal effect of locally applied oils has been observed by Garg and Muller in India¹³.

50% tinea capitis infections were of an inflammatory nature. The zoophilic fungi *T. mentagrophytes*, *M. canis* and the geophilic species *M. gypseum* accounted for 81% of tinea capitis infections. The anthropophilic fungi *T. rubrum*, *T. tonsurans* and *T. schoenleinii* accounted for only 7% of tinea capitis infections⁸.

Analysis of superficial mycotic diseases carried out in 1990-1994 in Sri Lanka showed a distinct change both in the anatomical distribution and the infecting fungal species (Table 2-5). With reference to the anatomical distribution, tinea corporis still dominated the scene although in slightly reduced proportion. Tinea cruris or groin infections were the second most common. Tinea pedis showed a twelve fold increase from 1% to 12% and tinea capitis also increased marginally from 1 to 6%.

It has been observed that the incidence and distribution of dermatomycosis in a community reflects the climatic conditions, the genetic predisposition of the people and their customs. The increasing incidence of tinea pedis in recent times may be accounted for by the increasing recent trend in urbanization of our rural masses including a change to "shoe wearing" habit. It is also a known fact that the infecting fungal species and the pattern of clinical disease vary from country to country and also at different points of time within the same locality¹⁴.

This was well illustrated in a study of the dermatophyte species isolated for the five-year period 1990 to 1994 (Table 4). It was observed that *T. rubrum* - accounted for 52% of the dermatophytes isolated for the latter period as opposed to 72% in the 1970s. Infections by the

geophilic fungus *M. gypseum* increased markedly from 5 to 11%. These infections were especially seen among children who played in the soil. *M. canis* infections remained low. *T. simii* infection found especially among the rural population in contact with monkeys has increased 10 fold from a mere 0.2 to 2%. Two new species, *T. tonsurans* and *T. violaceum* were detected during the latter period.

A very noteworthy feature is the apparent disappearance of the fungus *T. concentricum* the causative agent of tinea imbricata or "tokelau" from our environment. This disease with its characteristic loose scales described as "hideous" by Aldo Castellani in his autobiography² was highly prevalent in Sri Lanka (then known as Ceylon) in the early part of the century. Although the fungal etiology of this disease was established by Manson in 1872, the fungus was successfully cultured for the first time from a Sri Lankan patient in Colombo¹⁶. Strangely this fungus or the disease, tinea imbricata has not been seen in Sri Lanka after 1975.

In centuries gone by, and up to the first years of this century, ringworm of the scalp and the body had prevalence closely correlated with the socio-economic and hygienic conditions typical of the lower strata of urban population. As the factors predominating were over crowding, promiscuity, and insufficient cleanliness, ringworm was mainly due to the anthropophilic dermatophytes, transmitted from man to man.

With improving social conditions and sanitary education ringworm due to anthropophilic fungi decreased considerably and with a concomitant increase in the zoophilic and geophilic dermatophyte infections. In Sri Lanka there is a larger proportion of zoophilic and geophilic dermatophytosis as compared with other countries in the region or the West. I like to suggest that the attention paid to cleanliness in our community is partly responsible for this trend.

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