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Full Length Research Paper

Trichophyton rubrum – the predominant etiological agent in human dermatophytoses in Chennai, India

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The present study was undertaken to find the predominant etiological agent of dermatophytoses among the patients attending the outpatient clinic of Mycology Section, Department of Dermatology, Madras Medical College and Hospital, Chennai. Specimens were collected from suspected patients with dermatophytoses and examined for the presence of fungal elements, cultured, isolated and identified. Among the 90 suspected patients with clinical symptoms of dermatophytoses, 71 (78.9%) were confirmed in culture. *Trichophyton* genus was accounted for 93% of dermatophytoses, which was shared by *Trichophyton rubrum* (73.3%) and *Trichophyton mentagrophytes* (19.7%), followed by *Epidermophyton floccosum* (4.2%) and *Microsporum gypseum* (2.8%). It was noted that tinea corporis (64.8%) is the most prevalent infection followed by tinea cruris (26.8%), tinea pedis (5.6%) and onychomycoses (2.8%). *T. rubrum* was the predominant species responsible for the dermatophytoses, especially tinea corporis in Chennai, Tamilnadu, India. In addition it was also observed that *T. rubrum* was most predominant species responsible for the chronic dermatophytoses (81.8%). Further work is in progress to understand the protease profile of the isolates with relation to the chronisity of the infection.

Key words: Dermatophytoses, Dermatophytes, Tinea, *Trichophyton* and Skin infections.

INTRODUCTION

Dermatophyte infections are one of the earliest known fungal infections of mankind and are very common throughout the world. Although dermatophytoses does not cause mortality, it does cause morbidity and poses a major public health problem (Emmons and Binford, 1974) especially in tropical countries like India due to the hot and humid climate. No race in any geographical location is totally free from dermatophytoses (Rippon, 1988). Given that, the degree of immunosuppression and the number of immunosuppressed patients are increasing at an unprecedented pace, the management of dermatophytoses would be a definite challenge to mankind in the years to come.

The present study was undertaken to find the predominant etiological agent of dermatophytoses among the patients attending the out patient clinic of Mycology Section, Department of Dermatology in Madras Medical College and Hospital, Chennai. The study becomes significant as it was reported that the out patient turnover of Mycology section, Department of Dermatology of this Government Hospital is 7000 – 8000 per year (Kannan et al., 2006).

METHODOLOGY

Samples were collected from patients who were clinically suspected for dermatophytoses. The infected areas or lesions were wiped with 70% alcohol to remove the dirt and other ointments. Skin/nail scrapings were collected from the lesions particularly at the advancing borders of the infections by using blunt sterile scalpel/tweezers. Any small vellus hairs, which present within the lesions, were epilated. 10% KOH with 40% DMSO solution was used for direct microscopic examination of the sample for the presence of unstained refractile fungal elements (Singh and Beena, 2003).

The details such as site and extent of dermatophyte infection, antifungal therapy if any, occupation of patients and duration of infection were recorded meticulously.

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Table 1. Etiology of dermatophytoses.

Etiological Agent	Isolates		Male Patients		Female Patients	
	Number	%	Number	%	Number	%
T. rubrum	52	73.3	30	42.2	22	31.1
T. mentagrophytes	14	19.7	9	12.7	5	7
E. floccosum	3	4.2	1	1.4	2	2.8
M. gypseum	2	2.8	2	2.8	0	0
Total	71	100	42	59.1	29	40.9

Table 2. Clinical manifestation of dermatophytoses.

Clinical Manifestation	Isolates		*T. rubrum*		*T. mentagrophytes*		*E. floccosum*		*M. gypseum*	
	No. of Patients	%	No. of Isolates	%	No. of Isolates	%	No. of Isolates	%	No. of Isolates	%
Tinea Corporis	46	64.8	32	45.1	13	18.3	-	-	1	1.4
Tinea Cruris	19	26.8	16	22.6	-	-	2	2.8	1	1.4
Tinea Pedis	4	5.6	2	2.8	1	1.4	1	1.4	-	-
Onychomycoses	2	2.8	2	2.8	-	-	-	-	-	-
Total	71	100	52	73.3	14	19.7	3	4.2	2	2.8

On the basis of persistence of infection, the disease was designnated as chronic or non-chronic. The persistence of lesion for more than one year with or without remission and recurrence, with or without treatment failure to any anti fungal agent was designated as chronic infection. The cases that did not fit in to this category of definition were defined as non-chronic (Ranganathan, 1996). Once, the specimen was confirmed for the presence of fungal elements, the samples were streaked on the Sabouraud Dextrose Agar (SDA) slants prepared with Cyclohexamide and Chloromphenicol (Hi-media) under aseptic condition (Irene, 1995) and incubated at 30ºC for 4 weeks. The slants were monitored closely for fungal growth. The isolates were streaked on the SDA plates for identification based on the colony topography, texture, pigmentation and by microscopic examination of conidial morphology (Rippon, 1988; Fran Fisher, 1998). Cross comparison of the isolates were done with standard cultures received from Microbial Type Culture Collection Center (MTCC), Chandigarh, India: *Microsporum gypseum* (2819), *Microsporum canis* (2820), *Trichophyton rubrum* (296), *Epidermophyton floccosum* (613), *Trichophyton mentagrophytes* (Clinical isolate from Department of Microbiology, The New College).

RESULTS

Among the 90 suspected patients with clinical symptoms of dermatophytoses, 71 (78.9%) were confirmed in culture. It was recorded that among these confirmed dermatophytosis cases, 59.1% were males and 40.9% were females. All the patients were from rural places in and around Chennai, Tamilnadu. Among the 71 culture positive cases, *Trichophyton* spp. was isolated from 66 patients (93%) . *T. rubrum* was the predominant species to be isolated (73.3%), followed by *T. mentagrophytes* (19.7%). The other etiological agents encountered were *E. floccosum* (4.2%) and *M. gypseum* (2.8%) (Table 1).

In terms of site of infection, tinea corporis was prevalent among the majority of the cases (64.8%). *T. rubrum* (45.1%) was the major causative species isolated, followed by *T. mentagrophytes* (18.3%) and *M. gypseum* (1.4%) from tinea corporis patients. Tinea cruris was the second predominant infection observed (26.8%). *T. rubrum* (22.6%) was the predominant etiological agent isolated from tinea cruris patients followed by *E. floccosum* (2.8%) and *M. gypseum* (1.4%). Tinea pedis and onychomycoses were the least to be reported among the cases in the present study (Table 2).

It was noted that 15.5% (11 patients) of the dermatophytosis patients were reported with chronic infection of more than 1 year. *T. rubrum* accounted for 81.8% of chronic cases of infection followed by *T. mentagrophytes* (18.2%). It was also observed that 36.7% of infected population reported to the hospital between 1 to less than 6 months of infection followed by 31.0% cases with 6 months to 1 year of infection period. 16.8% of patient's reported to the hospital within 1 month of infection (Table 3).

DISCUSSION

Among the various fungal infections of human beings dermatophytoses is a most common infection throughout the world (Ranganathan et al., 1995). The results of the present study indicate that dermatophytoses is the most common skin disease in the rural population in and around Chennai, Tamilnadu, India. The genus *Trichophyton* especially *T. rubrum was* the predominant etiological agent of dermatophytoses. This coincides with the findings of most of the earlier works (Padhye et al., 1970;

Table 3. Chronisity of dermatophytoses.

Isolated Species	Total		<1 Month		1 month to < 6 Months		6 months to 1 year		> 1 Year	
	Isolates	%	Isolates	%	Isolates	%	Isolates	%	Isolates	%
T. rubrum	50	70.6	6	8.4	21	29.7	14	19.8	9	12.7
T. mentagrophytes	16	22.4	4	5.6	4	5.6	6	8.4	2	2.8
E. floccosum	3	4.2	1	1.4	-	-	2	2.8	-	-
M. gypseum	2	2.8	1	1.4	1	1.4	-	-	-	-
Total	71	100	12	16.8	26	36.7	22	31.0	11	15.5

Verenkar et al., 1991; Suman and Beena, 2003; Garg et al., 2004; Summana and Singaracharya, 2004; Kannan et al., 2006) . *T. mentagrophytes* emerged out to be the next dominant isolate followed by *E. floccosum* and *M. gypseum*. The members of the genera of *Epidermophyton* and *Microsporum* accounted for lower percentage of human infections when compared to *Trichophyton* species (Suman and Beena, 2003; Kannan et al., 2006).

Tinea corporis (infection of the glabrous skin) was the most common dermatophytoses reported. This was followed by tinea cruris. The manifestations of the above conditions were reported to be prevalent more in males than females. The findings are endorsed by earlier reports (Suman and Beena, 2003; Garg et al., 2004). It was observed that most of the patients were involved in exhausting physical work with long working hours under the sun, which leads to profuse sweating. Furthermore, they were tight synthetic clothes resulting in conditions like increased dampness and warmth of the body facilitating the skin surface suitable for the growth of dermatophytes. Such conditions are linked to the higher incidence of tinea corporis and tinea cruris. (Ranganathan et al., 1995; Summan and Beena, 2003). Occurrence of tinea pedis was relatively lower in the present study. Majority of the patients, who came for the treatment, belonged to lower economic groups and were observed mostly to be bare footed. The lower incidence of tinea pedis could be due to this reason as wearing shoes / socks causes dampness especially in the toe webs/ interdigital regions. Only two patients showed onychomycoses (nail infections) caused by *T. rubrum.*

Present study also showed the isolation of *M. gypseum* (geophilic dermatophytes), which could be accounted due to the patient's interaction with soil and domestic animals (Ramesh and Hilda, 1998). Ranganathan et al., (1997) reported the isolation of *M. gypseum* from the dermatophytoses of domestic and pet animals in and around Chennai.

It was observed that the living condition of the patients played a major role. Almost all the patients belonged to lower economic groups with occupations as farmers, daily wage laborers etc. Some of the patients had closer association with domestic/pet animals such as cattle, dogs, cats and fowls. The higher incidence of dermato - phytoses could be attributed to environmental conditions such as hot temperature and humid weather characteristic of the geographical location in and around the study area. Poor personal hygiene and illiteracy are other major factors that influence dermatophytoses in this part of the country. Several earlier workers have reported similar findings (Padhye et al., 1970; Kamalam and Thambiah, 1976; Ranganathan et al., 1995). Current results also revealed that males are more prone to dermatophytoses than females. This may be co-related with the occupational hazards related to their nature of work and the frequent interaction with different peoples of the society. The lower incidence in females may be also due to the non-reporting of the female patients to the hospitals due to the prevailing social stigma in the rural population in India. These observations were supported by some of the earlier reports (Suman and Beena, 2003; Garg et al., 2004; Summana and Singarachara, 2004).

The lower number of cases reported within one month of infection is due to the ignorance of people on skin infections. The results reveled that people generally respond to a skin infection at least after a month time after trying different self medications like applying Vaseline, herbal paste etc. Due to this improper diagnosis and treatments, the dermatophytoses infection prolongs and patients start visiting hospitals once they realize the persistence of infection, which generally happens after one or two months. This may be the reason for the higher turnover of the patients to the hospital after a month. The dermatophytoses is considered to be chronic when the infection persists more than one year with or without treatment (Ranganathan, 1996). *T. rubrum* generally exhibits asymptomatic infections with immediate type hypersensitive immune reaction that makes it as the most predominant species responsible for chronic dermatophytoses (Aya et al., 2004). Severity of the lesions produced by *T. rubrum* is less when compared to other species of dermatophytes. It is strikingly evident in our present study as we find that the isolates from chronic cases were mostly *T. rubrum*. The case history of 2 patients indicates the persistence of lesions were more than 10 years (data not included). Because of the non- inflammatory mild lesions, early lesions were untreated and neglected by the patients. The protease production is highly host specific showing reduced physiological activity when growing on their preferred host (Rippon, 1988; Rippon and McGinnis,

1995). This would explain the well-established anthropophization of these species. Ranganathan (1996) reported a similar finding on the relationship between chronisity and low protease profile of *T*. *rubrum* isolates. Further work is in progress to understand the protease profile of the isolates especially the keratinophilic activity with relation to the chronisity of the infection.

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