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Epidemiology of dermatophytosis in and around Tiruchirappalli, Tamilnadu, India

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ABSTRACT

Objective: To study the occurrence and causative agents (fungus) of dermatophytosis in patients attending the Dermatology Section of Bharat Heavy Electrical Limited Hospital and Annal Gandhi Memorial Government Hospital, Tiruchirappalli, Tamilnadu, India. **Methods:** A total of 519 samples were collected including infected skin, hair and nail samples for a period of 1 year. Before collecting the samples, 70% alcohol was applied to the infected area and ensured that it was totally dry. Skin samples were collected by scrapping, nail samples by clipping and hair samples collected by using sterile scalpel or forceps. Identification of the causative pathogen was done by performing slide culture, lacto–phenol cotton blue mount, hair perforation tests and urease tests. **Results:** Dermatophytosis was manifested clinically more in the age group of 11–20 and 21–30 years. Among various clinical conditions, tinea capitis was common in children below 12 years. Microbiological investigation revealed the presence of dermatophytic fungi in 78% of the samples. *Trichophyton rubrum* was the predominant pathogen followed by *Trichophyton mentagrophytes*. **Conclusions:** Further intensive epidemiological studies of dermatophytic fungus–induced dermatophytosis, which have public health significance, are needed.

1. Introduction

Dermatophytosis is a superficial fungal infection on the skin, hair and nails. It is one of the most common diseases around the world caused by dermatophytic fungal species of *Trichophyton*, *Microsporum* and *Epidermophyton*. Dermatophytes typically do not affect the mucus membranes but rather affect the keratinized tissues and spread by direct contact from infected human beings (anthropophilic organisms), animals (zoophilic organisms), and soil (geophilic organisms) and by indirect way from fomites. Although the clinical signs of dermatophytosis may vary depending on the affected region of the body, pruritis is the most common symptom in humans^[1].

Dermatophytic fungi can be identified easily even in a small laboratory. As there was no report on the incidence of dermatophytosis and dermatophytic fungi from the state of Tamilnadu especially in the warmer district like Tiruchirappalli, an attempt was made by us to look for the epidemiology of dermatophytosis in patients attending the dermatology section of Bharat Heavy Electrical Limited Hospital and Annal Gandhi Memorial Government Hospital, Tiruchirappalli, Tamilnadu, India.

2. Materials and methods

A total of 519 clinical samples were collected from patients attending Bharat Heavy Electrical Limited Hospital and the dermatology unit of Annal Gandhi Memorial Government Hospital, Tiruchirappalli. The samples were collected from January to December 2008. Before collecting the sample the infected area was prepared with 70% alcohol and ensured for

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total dryness. Then the samples were collected by scrapping, if it is skin, clipping if it is nail or hair by making use of the sterile scalpel or forceps. Collected samples were kept in a sterile container and transferred to the laboratory for further analysis.

Initial observation was made immediately after sampling at the site itself. For this KOH mount was made and looked for fungal hyphae. Further confirmation was made in the laboratory after subjecting the sample for culture on SDA (Hi-media) and DTM (Hi-media) plates. Further identification was done by performing slide culture technique, lacto-phenol cotton blue mount, hair perforation tests and urease tests.

3. Results

A total of 519 clinical samples were collected from dermatophytosis cases attending BHEL Hospital and Annal Gandhi Memorial Government Hospital, Tiruchirappalli. The details regarding clinical manifestation and sex were given in the Table 1. Tinea corporis (35.4%) was the predominant clinical condition followed by tinea cruris (16.8%) and tinea capitis (16.7%). Male members were affected more than the female (67.1%).

Table 1

Details of samples with reference to clinical manifestation and sex.

Clinical manifestation	Total number of samples (n, %)	Sex	
		Male (n, %)	Female (n, %)
Tinea cruris	87 (16.76)	87 (100.0)	0 (0.0)
Tinea corporis	184 (35.4)	121 (65.8)	63 (34.2)
Tinea capitis	86 (16.6)	47 (54.5)	39 (45.3)
Tinea glutealis	21 (4.0)	21 (100.0)	0 (0.0)
Tinea faciei	38 (7.3)	14 (36.8)	24 (63.1)
Tinea pedis	24 (4.6)	18 (75.0)	6 (25.0)
Tinea unguium	55 (10.5)	25 (45.5)	30 (54.5)
Tinea manuum	10 (1.9)	5 (50.0)	5 (50.0)
Tinea totalis	13 (2.5)	9 (69.2)	4 (30.8)
Tinea auxillaris	1 (0.2)	1 (100.0)	0 (0.0)
Total	519 (100)	348 (67.1)	171 (32.9)

Table 2

Dermatophytosis with reference to clinical manifestation versus age group (n, %).

Clinical manifestations	Total no of samples	Different age group							
		1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
Tinea cruris	87 (16.76)	0 (0.0)	22 (25.2)	18 (20.6)	10 (11.4)	15 (17.2)	13 (14.9)	7 (8.0)	2 (2.2)
Tinea corporis	184 (35.4)	3 (1.6)	48 (26.0)	57 (30.9)	37 (20.1)	29 (15.7)	6 (3.2)	4 (2.1)	0 (0.0)
Tinea capitis	86 (16.57)	28 (32.5)	28 (32.5)	22 (25.5)	3 (3.4)	3 (3.4)	2 (2.3)	0 (0.0)	00 (0.0)
Tinea glutealis	21 (4.0)	1 (4.7)	3 (14.2)	4 (19.0)	0 (4.7)	3 (14.2)	6 (28.5)	3 (14.2)	0 (0.0)
Tinea faciei	38 (7.32)	13 (34.2)	14 (36.8)	5 (13.1)	3 (7.8)	2 (5.2)	1 (2.6)	0 (0.0)	0 (0.0)
Tinea pedis	24 (4.62)	1 (4.1)	4 (16.6)	5 (20.8)	6 (25.0)	2 (8.3)	4 (16.6)	1 (4.1)	0 (0.0)
Tinea unguium	55 (10.5)	2 (3.6)	9 (16.3)	14 (25.4)	11 (20)	14 (25.4)	4 (7.2)	2 (3.6)	0 (0.0)
Tinea manuum	10 (1.9)	2 (20.0)	2 (20.0)	2 (20.0)	2 (20.0)	2 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea totalis	13 (2.5)	1 (7.6)	3 (23.0)	4 (30.7)	2 (15.3)	2 (15.3)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea auxillaris	01 (0.19)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Clinical manifestation in relation to age showed that patients with age group 11–20 years (25.6%) and 21–30 years (25.4%) were affected more. Tinea corporis and tinea cruris were the predominant clinical conditions observed. Tinea unguium was found to be more in patients of age group 21–30 years and 41–50 years (Table 2).

Initial microbiological observation at the collection spot revealed the presence of fungal hyphae by KOH mount in 407 (78.4%) cases (Table 3). Split up analysis showed the positive pattern of fungal hyphae in various clinical conditions *i.e.*, tinea glutealis (90.4%), tinea manuum (90%), tinea totalis (100%), tinea cruris (82.8%) and tinea corporis.

Table 3

Positivity pattern of fungal hyphae by KOH mount (n, %).

Clinical manifestation	Total number of samples (n=519)	KOH mount (%)	
		Positive (n=407)	Negative (n=112)
Tinea cruris	87 (16.76)	72 (82.75)	15 (17.24)
Tinea corporis	184 (35.4)	149 (80.9)	35 (19.02)
Tinea capitis	86 (16.57)	59 (68.6)	27 (31.3)
Tinea glutealis	21 (4.0)	19 (90.47)	2 (9.5)
Tinea faciei	38 (7.32)	29 (76.3)	9 (23.6)
Tinea pedis	24 (4.62)	18 (75.0)	6 (25.0)
Tinea auxillaris	1 (0.19)	1 (100.0)	0 (0.0)
Tinea unguium	55 (10.5)	38 (69.0)	17 (30.9)
Tinea manuum	10 (1.9)	9 (90.0)	1 (10.0)
Tinea totalis	13 (2.5)	13 (100.0)	0 (0.0)
Total	519 (100.0)	407 (78.42)	112 (21.5)

Further identification of dermatophytic fungi showed the presence of *Trichophyton mentagrophytes*, *Trichophyton rubrum*, *Trichophyton tonsurans*, *Trichophyton verucosum*, *Microsporum gypseum*, *Microsporum canis*, *Microsporum nanum* and *Epidermophyton floccosum*. Among all the pathogens identified *Trichophyton rubrum* (32.8%) was the predominant pathogen followed by *Trichophyton mentagrophytes* (29.2%) was the co-dominant one (Table 4).

Table 4

Prevalence pattern of dermatophytic fungi (n, %).

Clinical manifestation	Total number of samples	Dermatophytic fungi							
		<i>T.m</i>	<i>T.r</i>	<i>E.f</i>	<i>M.n</i>	<i>M.c</i>	<i>M.g</i>	<i>T.t</i>	<i>T.v</i>
Tinea cruris	87 (16.8)	20 (22.9)	38 (43.6)	19 (21.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea corporis	184 (35.4)	43 (33.3)	83 (45.1)	16 (8.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.5)	2 (1.08)
Tinea capitis	86 (16.6)	17 (19.8)	0 (0.0)	0 (0.0)	0 (0.0)	14 (16.3)	29 (34.7)	0 (0.0)	0 (0.0)
Tinea glutealis	21 (4.0)	8 (38.1)	8 (38.1)	3 (14.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea faciei	38 (7.3)	26 (68.4)	4 (10.5)	0 (0.0)	1 (2.6)	0 (0.0)	0 (0.0)	1 (2.6)	0 (0.0)
Tinea pedis	24 (4.6)	5 (20.8)	12 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.1)	0 (0.0)
Tinea axillaris	1 (0.1)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea unguium	55 (10.5)	20 (36.3)	16 (29.0)	3 (5.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea manuum	10 (1.9)	9 (90.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Tinea totalis	13 (2.5)	4 (30.8)	8 (61.5)	1 (7.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	519 (100.0)	152 (29.2)	170 (32.8)	042 (8.0)	1 (0.1)	14 (2.7)	29 (5.5)	3 (0.6)	2 (0.4)

Note: *T.m* – *Trichophyton mentagrophytes*; *T.r* – *Trichophyton rubrum*; *E.f* – *Epidermophyton floccosum*; *M.n* – *Microsporium nanum*; *M.c* – *Microsporium canis*; *M.g* – *Microsporium gypseum*.

4. Discussion

The epidemiology of superficial fungal infections has changed significantly in the last century and reflects changes in socioeconomic conditions, lifestyle, and migration. Few studies have investigated the etiology of superficial fungal infections in the developing world, and consequently, there is less knowledge of any changes to their epidemiology[2,3]. It is difficult to ascertain reliably the overall incidence and prevalence of the various skin diseases caused by superficial mycoses in different parts of the world because studies of one region of the country may not be a true representation of the overall disease pattern of that country; furthermore, incidence and prevalence figures may only be representative of the population sampled, which may have associated risk factors for infection[4]. The higher incidence of dermatophytosis could be attributed to environmental conditions. The presently studied area most of the residents are of labors and farmers. There nature of job, personnel hygiene and the climatic condition could have been the reason for dermatophytic fungi induced dermatophytosis.

This preliminary attempt has given a clear picture about the association of dermatophytosis and dermatophytic fungi in and around Tiruchirappalli. Tinea corporis was found to be the predominant clinical manifestation in the age group 11 to 30 years. This affects the trunk, often in exposed areas like the abdomen or limbs, causing red patches. It is more common in children than in adults and occurs most frequently in hot climate[5]. Tinea cruris is an itchy, red rash in the groin and surrounding area and is commonly seen in young men living in a warm climate happens to be the second predominant clinical manifestation in this study revealed that the infestation was more in men than women, predominantly caused by anthropophilic dermatophytes. 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[6].

Trichophyton rubrum generally exhibits asymptomatic infections with immediate type hypersensitive immune reaction that makes it as the most predominant species responsible for chronic dermatophytosis[7]. A total of 8 different dermatophytic fungi were identified in the present study *Trichophyton rubrum* (32.8%) was the predominant pathogen. The findings of the present study is evident by the work of Venkatesan and his coworkers[6] in the similar predominant etiological agent in human dermatophytosis in Chennai, India, they reported that the isolates from chronic cases were mostly *Trichophyton rubrum*.

Recent studies reported that plants have limitless ability to synthesize secondary metabolites to treat various bacterial[8–12] and fungal infections[13–17]. Antimicrobials of plant origin are efficient in the treatment of infectious diseases mitigating simultaneously many of the side effects that are often associated with synthetic ones[18–24]. The use of medicinal plants in the treatment of dermatophytosis will help to reduce the dependence on the use of microbial or chemically synthesized antimicrobials and thus overcome the problem of the emergence of fungi being resistant to antifungal chemicals on various etiological agents of dermatophyte infections[25]. Further work is under progress to understand the exact cause and also to mitigate this infectious disease.

Conflict of interest statement

We declare that we have no conflict of interest.

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