

Original Research Article

# Prevalence of Dermatophytosis in patients in a tertiary care centre in and around Cuddalore district

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	International Archives of Integrated Medicine, Vol. 4, Issue 8, August, 2017. Copy right © 2017, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a>	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 20-04-2017	Accepted on: 28-07-2017
	Source of support: Nil	Conflict of interest: None declared.
<b>How to cite this article:</b> P. Gunasekaran. Prevalence of Dermatophytosis in patients in a tertiary care centre in and around Cuddalore district. IAIM, 2017; 4(8): 91-95.		

## Abstract

**Background:** The common cause of skin infections are dermatophytes and opportunistic fungi. Aim of this study was to isolate and identify the fungal agents from clinical samples from patients with different mycoses. Superficial mycoses are among the most frequent forms of human infections, affecting more than 20–25% of the world's population. They are predominantly caused by a group of closely related keratinophilic mycelia fungi (dermato-phytes) in the genera of Trichophyton, Microsporum, and Epidermophyton. These groups of fungi invade the stratum corneum of the skin or other keratinized tissues derived from the epidermis such as hair and nails.

**Aim and objectives:** The present work aims at evaluation of rate of incidences of dermatophytic infections (group wise), and etiological agents with associated symptoms. In addition, we also determine to test the sensitivity of present diagnostic procedures.

**Materials and methods:** Samples were collected from 100 patients. A portion of each sample was examined microscopically and the remaining portion of each sample was cultured onto plates of Sabouraud's dextrose agar containing chloramphenicol with and without cycloheximide. Dermatophyte isolates were identified by studying macroscopic and microscopic characteristics of their colonies. Preliminary identification was done by conventional methods and confirmed by Polymerase Chain Reaction – Restriction Fragment length Polymorphism (PCR -RFLP) technique.

**Results:** All over 62/100 specimens were KOH positive and 48/62 (82.7%) samples were culture positive. Of these, highest isolation rate was obtained in opportunistic mycoses such as candidiasis (29/29, 100%). Dermatophytes were isolated in 41/62 (66.3%) specimens and Trichophyton rubrum was the commonest isolate in skin samples (44/62) among the patients suffering from dermatophytosis. Phaeoannellomyces Wernicke was isolated in a patient suffering from tinea nigra.

The study signifies the importance of mycological examination in the diagnosis of various mycoses for their effective management.

**Conclusion:** Dermatophytoses are distributed worldwide with increased incidence especially in a tropical country like India. Several factors such as age, sex, illiteracy, poor hygiene and social economy influence the dermatophyte infection. In the present study we have attempted to understand the epidemiological status of the dermatophytes in a tertiary care centre in Cuddalore, Tamil Nadu, India. *Tinea corporis* was the predominant clinical site from which dermatophytes were isolated. *T. Rubrum* and *T. Mentagrophytes* have been the major etiological agents and that has been evinced by our study.

## Key words

Dermatophytoses, Hair and nails, *T. Rubrum* and *T. Mentagrophytes*.

## Introduction

Dermatophytes cause infections of the skin, hair and nails, obtaining nutrients from keratinized material. The organisms colonize the keratin tissues causing inflammation as the host responds to metabolic by-products [1]. Colonies of dermatophytes are usually restricted to the nonliving cornified layer of the epidermis because of their inability to penetrate viable tissue of an immunocompetent host. Invasion does elicit a host response ranging from mild to severe. Acid proteinases, elastase, keratinases, and other proteinases reportedly act as virulence factors [2]. The development of cell-mediated immunity correlated with delayed hypersensitivity and an inflammatory response is associated with clinical cure, whereas the lack of or a defective cell-mediated immunity predisposes the host to chronic or recurrent dermatophyte infection. Some of these skin infections are known as ringworm or tinea. Toenail and fingernail infections are referred to as onychomycosis. Dermatophytes usually do not invade living tissues, but colonize the outer layer of the skin [3]. Occasionally the organisms do invade subcutaneous tissues, resulting in kerion development. Diagnosis of these mycoses is made from mycological studies, direct examination, stains, isolation and identification of the fungi. Treatment includes systemic antifungal, topical antifungal and keratolytics. Superficial mycoses are fungal infections limited to the stratum corneum and its adnexal structures. Diagnosis of these mycoses is made

from mycological studies, direct examination, stains, and isolation, and identification of the fungi. Tinea infections are among the most common dermatologic conditions throughout the world [4]. To avoid a misdiagnosis, identification of dermatophyte infections requires both a fungal culture on Sabouraud's agar media and a light microscopic mycological examination from skin scrapings [5]. Preventative measures of Tinea infections include practicing good personal hygiene, keeping the skin dry and cool at all times and avoiding sharing towels, clothing, or hair accessories.

With infected individuals *T. soudanense*, *T. gourvillii* and *T. yaoundii* are restricted to Central and West Africa. *T. concentricum* is confined to islands in the South Pacific. The increasing mobility of the world's population is disrupting several epidemiological patterns. Some dermatophytes like *E. floccosum*, *T. rubrum* and *T. tonsurans* are globally distributed [6].

## Materials and methods

This study was undertaken for a period of six months from August 2016 to January 2017. All the clinically suspected 100 cases were subjected to mycological work up. The specimens included skin scales, hair, hair roots and pus in cases of superficial mycoses. Biopsy tissue and grain were the specimens in deep mycoses. Direct microscopic examination was undertaken in 10% potassium hydroxide (KOH) wet mount for the specimens of skin scales, pus crust, biopsy tissue

and grains, while 40% KOH was employed for hair and nail specimens. Grains of mycetoma were also subjected to Gram stain and modified Ziehl Neelsen stain (1% H<sub>2</sub>SO<sub>4</sub>) [7].

### Sample process

Direct microscopic examination: Direct microscopic examination of the scraping placed on a microscope slide with one or two drop of 10% potassium hydroxide (KOH) and a cover slip was performed. The sample was warmed for 5 minutes over a flame [8]. Each treated slide was then carefully examined under low (10x) and high (40x) power objective for the presence of hyphae and/or arthroconidia [8].

### Fungal culture

Each scraping was cultured into Sabouraud Dextrose chloramphenicol actidione agar. A duplicate inoculation of the specimen was also cultured on sabouraud's dextrose cycloheximide agar. The plates were incubated at 28°C for up to 4 weeks and examined at 2 to 3 day intervals for fungal growth. Fungal isolates were subcultured onto plates of Sabouraud's agar. The isolates were examined visually and microscopically for morphology of fungi using lacto phenol cotton blue by slide culture technique. The dermatophytes species were identified by gross and microscopic morphology and by in-vitro tests. Evaluation of the relative percent occurrence (RPO) of the fungi and sensitivity of KOH test (results of KOH test corresponds to culture test indicated the sensitivity of the KOH test) was done. The clinical isolates were further maintained in agar slants [9].

### Results

A total of 100 patients attending private set were first screened for the presence of dermatophytosis. It was observed that the highest number of dermatophytosis was seen in the age group of 31-40 years (40.76%) (Table - 1). 100 samples were analysed, sex wise and it was found that 60 were males (62.3%) and 40 were females (37.7%). The samples were further analysed depending upon the clinical

manifestations and it was found that 61 cases out of 100 (61%) had Tinea corporis, 31 out of 100 had Tinea cruris (31%), 3 had Tinea faciei (3%), 2 had Tinea capitis (2.0%) and 3 had Tinea unguium (3%). Dermatophyte species isolated were as per Table – 2.

**Table – 1:** Clinical presentation of micro-organism.

Diagnosis	Patients	%
Tinea corporis	61	61
Tinea cruris	31	31
Tinea faciei	3	3
Tinea capitis	2	2
Tinea unguium	3	3

**Table – 2:** Dermatophyte species isolated.

Species	Patients	%
<b>T. rubrum</b>	34	54.8
<b>T. mentagrophytes</b>	19	30.6
<b>T. violaceum</b>	2	3.2
<b>E. floccosum</b>	2	3.2
<b>M. gypseum</b>	5	8.02

In gender wise correlation of clinical presentation, among males 60 had Tinea corporis, 25 had Tinea cruris, 20 had Tinea faciei, 8 had Tinea capitis and 4 had Tinea unguium. So in males, Tinea corporis was the commonest lesion followed by Tinea cruris. Among female, 40 had Tinea corporis, 26 had Tinea cruris, 2 had Tinea faciei, 8 had Tinea capitis and 6 had Tinea unguium. Here also Tinea corporis was the commonest lesion followed by Tinea cruris.

### Discussion

T. rubrum was the chief isolate from skin scales (31/44) in the present study similar to many other reports. This is the commonest agent isolated from glabrous skin of the body, groin folds and the feet. T. mentagrophytes was the second common isolate from the body site 7/44 (16.7%) as has been observed in other studies [10]. E. floccosum was isolated from two specimens obtained from the skin and this was the third

common isolate from the glabrous skin. *T. violaceum* seemed to be the chief isolate from the scalp/ scalp hair (14/62). This agent is still the commonest isolate from cases of tinea capitis in India. This agent was also isolated from a specimen of skin scales (2/44). *T. simii*, the zoophilic species, could be isolated from scalp/scalp hair and this formed the second common isolate from the scalp 3/25 (12%) [11]. The prevalence of the *T. simii* among dermatophytes in general has been observed to be 1% [11]. The prevalence of *T. simii* in tinea capitis was found to be 1.4% in Tamilnadu, India [12] and as high as 10% has been reported from Sri Lanka [13]. *T. rubrum* was the least common isolate (2/25) from the scalp and this considered to be the common agent causing glabrous type of tinea capitis which is usually encountered in adults. The isolates from the nail specimens were *T. rubrum* (2/4) and *T. mentagrophytes* (2/4) and these agents are the common species infecting the nail [12]. During the infection maximum cases were found to show symptoms such as redness, itching and dry patches while the duration of infection was variable ranging from a few days up to many years while some also complained about the infection to be seasonal and only confined to summers. To test and confirm the presence of fungal infection KOH result and culture findings were considered which revealed that KOH test is 73.33% sensitive (out of 100 cases, 74 were both KOH test and culture test positive) [13]. The data revealed that the KOH test was false positive (KOH positive and culture negative) in 11 cases and false negative (KOH negative and culture positive) in 05 cases studied but 16 cases were negative from both the test results, and were considered free from fungal infection. On the basis KOH and culture test results 43 males (out of 60) and 32 (out of 40) females were found to be infected with fungal dermatophytic infection. In a previous study, out of 155 patients clinically suspected with dermatophytosis, 105 specimens were skin scrapings and 50 were hair. Results of KOH microscopy and fungal culture were compared showing that KOH microscopy was positive in 70% cases while fungal culture

showed positive results in 25.8% cases [14]. The predominant clinical manifestations of dermatophytosis vary considerably in different studies reported in literature. In a study conducted in India, tinea corporis (35.4%) was the predominant clinical condition followed by tinea cruris (16.8%) and tinea capitis (16.7%). Similar study conducted in Iran between March 2005 and March 2007 by Rassai, et al. revealed that tinea cruris and tinea corporis were the most common clinical manifestation [14].

## Conclusion

This study has revealed that the prevalence of microscopic and culture confirmed dermatophytic infections in the study subjects was high. The present study has also depicted that tinea corporis was the dominant clinical manifestation involving 61.1% of the total cases of dermatophytosis. Of the total number of 100 dermatophyte isolates 39.2 % was accounted by *T. Rubrum*, *T. Mentagrophytes* and *T. Tonsurans*. Among the three dominant species, *T. mentagrophytes* accounted for 30.69% of the total isolates. Because of the psychological effects and high morbidity in terms of loss of working days and treatment dermatophytic infection is a public health problem. Therefore, to obtain a true representation of the overall disease pattern of the country more such types of studies should be conducted.

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