

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.803.023>

## Spectrum of Dermatophytic Fungal Infection in Tertiary Care Hospital, Davanagere

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### ABSTRACT

Superficial mycoses are the most frequent forms of human infections, Dermatophytes affecting more than 20 to 25% of the world's population. They are predominantly caused by the keratinophilic fungi in the genera of *Trichophyton*, *Microsporum* and *Epidermophyton*. 1. Isolation and identification of Dermatophytes causing skin, hair and nail infections. 2. To know the prevalence of Dermatophytic infections in Tertiary care hospital. This study was conducted from April 2018 to July 2018 in Department of Microbiology, J. J. M. Medical College, Davanagere. From 221 clinically suspected Dermatophytosis cases 72 skin scrapings, 2 hair samples and 147 nail clippings were collected according to standard procedure. All samples were subjected to direct microscopy in KOH and culture on Sabouraud's dextrose agar with cycloheximide. In case of growth, etiological agents were confirmed by the characteristic morphology of the colony and by studying the microscopic appearance of the fungus on Lacto Phenol Cotton Blue (LPCB) mount and slide culture. Out of 221 cases, Males 137(61.9%) and Females 84(38%) and majority were in age group of 31 to 40 years (45.6%). Among 221 samples, 145 isolates were isolated. 149(67.4%) samples were positive by KOH mount and 145(65.6%) were positive by culture. Dermatophytes were grown in 145(65.6%) isolates. Among Dermatophytes, *Trichophyton rubrum* 68(46.9%) was most commonly isolated species followed by *Trichophyton mentagrophytes* 39(26.9%), *Microsporum gypseum* 22(15.2%), *Epidermophyton floccosum* 13(8.9%) and *Trichophyton tonsurans* 3(2.1%). Dermatophytosis is the common superficial fungal infection among males and around age group of 31 to 40 years. *Trichophyton rubrum* remains the most common etiological agent. Hence clinic-epidemiological data is helpful for creating public awareness and for development of diagnostic, preventive and treatment strategies.

#### Keywords

Superficial mycoses, Dermatophytosis, *Trichophyton rubrum*, *Trichophyton mentagrophytes*, Lactophenol Cotton Blue mount

#### Article Info

Accepted:  
04 February 2019  
Available Online:  
10 March 2019

### Introduction

Dermatophyte infections are common worldwide, and dermatophytes are the prevailing causes of fungal infection of the skin, hair, and nails. Superficial mycoses are among the most frequent forms of human infections<sup>(1)</sup>. They are predominantly caused

by keratinophilic fungi (Dermatophytes) in a genera of *Trichophyton*, *Microsporum* and *Epidermophyton*<sup>(2)</sup>. These infections lead to a variety of clinical manifestations, such as *Tinea corporis*, *Tinea cruris*, *Tinea pedis*, *Majocchi's granuloma*, *Tinea capitis* and *Tinea unguium* (Dermatophyte onychomycosis)<sup>(3)</sup>.

Dermatophytes produce keratinases which degrade the keratin and thus invade the superficial skin tissue. The infection due to these pathogens are generally cutaneous and restrict to non-living, cornified layers of the skin<sup>(4)</sup>. Overcrowding, low socio-economic status, unhygienic living conditions, outdoor work, increased physical activity and excessive sweating predisposes to the ring worm infections<sup>(5)</sup>.

Dermatophytosis constitutes 16 to 75% of all mycological infections. The infection is common worldwide with higher prevalence in tropical countries<sup>(5)</sup>. Skin infections due to dermatophytes have become a significant health problem affecting all groups which are acquired due to hot humid climatic conditions of our country<sup>(6)</sup>. Though dermatophytosis does not cause mortality it does leads to morbidity and is responsible for major health problems<sup>(7)</sup>. Any clinical diagnosis is in need to be supported by laboratory diagnosis. Culture is necessary adjacent to direct microscopic examination for definitive identification of etiological agent<sup>(8)</sup>.

In many instances the choice of therapy may depend on the specific identification of invasive mould. This is especially important in the nail and skin infections, often caused by non dermatophytic filamentous fungi which are often resistant to the usual dosage of the therapy used for dermatophytic infection. Although the infection is not invasive, its widespread nature and cost of the treatment is a major public health problem and causes colossal damage to the economic status of the tropical countries like India<sup>(9)</sup>.

There are not many studies reported recently on the prevalence of dermatophytosis in Davanagere, Karnataka, India. Therefore this work was framed to study the isolation, identification and prevalence of dermatophytosis in tertiary care hospital.

The main objectives of this study includes, Isolation and identification of dermatophytes causing skin, hair and nail infections. And to know the prevalence of dermatophytic infections in tertiary care hospital.

## **Materials and Methods**

The study was conducted in department of microbiology, J. J. M medical college, Davanagere, Karnataka, India for 4 months from April –July 2018 from the clinical specimens such as skin scrapings, hair and nail clippings. Institutional ethical clearance was taken at the beginning of the study

A total of 221 samples which included 72 skin samples, 2 hair samples and 147 nail samples, from clinically suspected cases of Dermatophytosis were collected. A detailed history regarding age, sex, occupation, duration of complaint was taken. Patients treated with antifungals or topical steroids in the recent past were excluded from the study. Depending on the presenting condition skin scrapings, nail clippings and crusts were collected in sterile black paper packets. Specimen collected was divided into two portions. The first portion was subjected to potassium-hydroxide (KOH) preparation (10% KOH for skin and hair; 40% KOH for nail) for the demonstration of fungal elements.

After direct microscopic examination, irrespective of demonstration of fungal elements, the second portion of the sample was inoculated into a test tube containing Sabouraud's dextrose agar with chloramphenicol and cycloheximide. This was incubated at room temperature for up to 10 days to 3 weeks. If no growth was found after 3weeks, it was taken as negative for growth of fungi. Fungal isolates were identified based on colony morphology, pigmentation, growth rate, microscopy (Lactophenol Cotton Blue mount), slide

culture and other relevant tests as per standard instructions.

### Results and Discussion

In this study, 221 cases of clinically diagnosed Dermatophytosis cases were studied. Males were more predominant 137 (61.9%) compared to females 84 (38%). Male: female ratio was 1.63:1. Majority of cases were observed between age groups of 31–40 years (35.2%) (Table 1). Among 221 samples, 145 isolates were isolated. 149(67.4%) samples were positive with direct microscopy by KOH mount and 145(65.6%) were positive with culture. Dermatophytes were grown in 145(65.6%) isolates.

Among Dermatophytes, *Trichophyton rubrum* 68(46.9%) were most commonly isolated species followed by *Trichophyton mentagrophytes* 39(26.9%), *Microsporum gypseum* 22(15.2%), *Epidermophyton floccosum* 13(8.9%) and *Trichophyton tonsurans* 3(2.1%).

Fungal elements by KOH mount were observed in 149 (67.4%) and culture were positive in 145 (65.6%). Out of 149(67.4%) KOH positive cases 132 (88.6%) yielded growth in culture. Among KOH negative 72(32.6%) cases, 17 (11.4%) were culture positive. 55 cases were negative by both KOH mount and culture (Table 2 and Fig. 1–5).

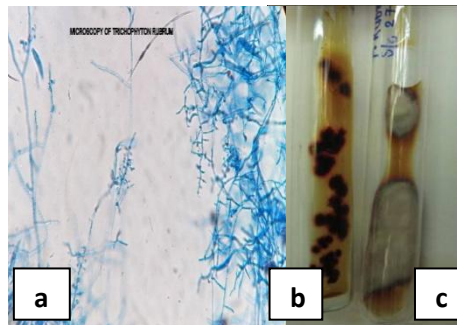
**Table.1** Age distribution in years

AGE (IN YEARS)	NO OF PATIENTS
0-10	3
11-20	18
21-30	63
31-40	78
41-50	29
51-60	18
61-70	10
>71	2
<b>TOTAL</b>	<b>221</b>

**Table.2** Distribution of cases by KOH and culture findings

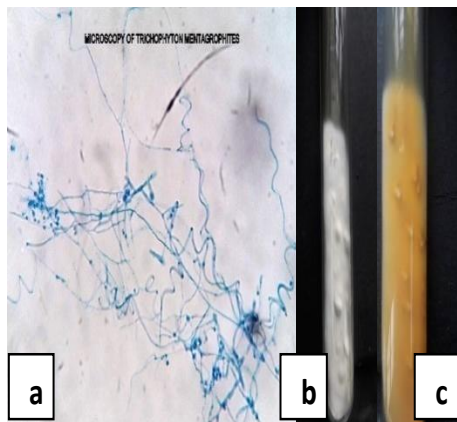
KOH and Culture Findings	Number of patients (n=221)	Percentage
KOH +ve,	149	67.4%
Culture +ve	145	65.6%
KOH +ve, Culture +ve	132	88.6%
KOH –ve, Culture +ve	17	11.4%
KOH +ve, Culture -ve	17	11.4%
KOH –ve, Culture –ve	55	24.8%
Total KOH and/or culture positive	149	67.4%

**Fig.1** *Trichophyton rubrum*



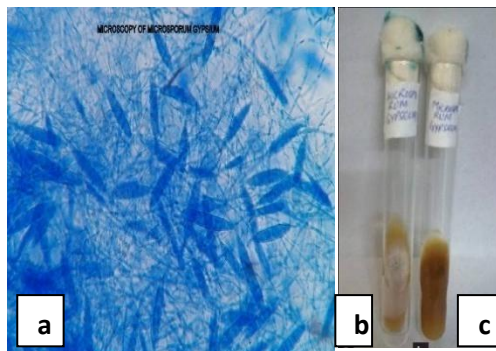
(a) Lacto phenol cotton blue mount showing tear drop shaped microconidia (birds on fence appearance) and few macroconidia of pencil shaped. (b) Growth on Sabouraud's dextrose agar (reverse) shows redpigmentation. (c) Velvety growth on Sabouraud's dextrose agar

**Fig.2** *Trichophyton mentagrophytes*



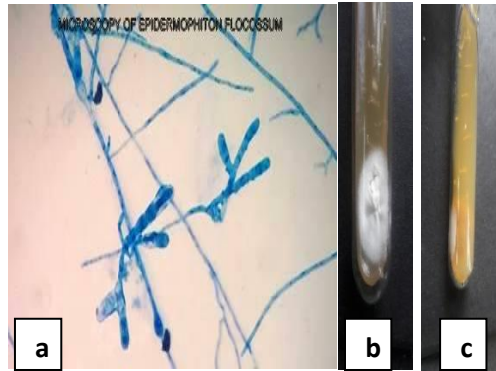
(a) Lacto phenol cotton blue mount showing pyriform microconidia, spiral hyphae and cigar shapedmacroconidia. (b) White powdery colonies seen on Sabouraud's dextrose agar. (c) Growth on Sabouraud's dextrose agar (reverse) with no pigmentation

**Fig.3** *Microsporum gypseum*



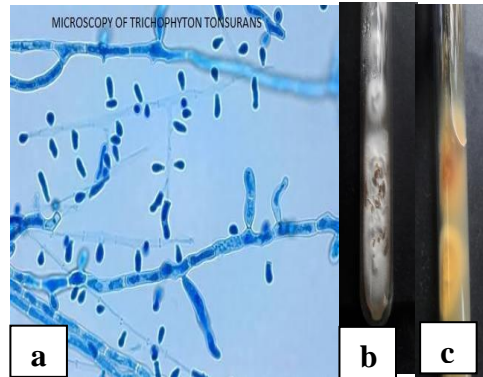
(a) Lacto phenol cotton blue mount showing spindle shaped macroconidia (b) Buff coloured powdery growth on Sabouraud's dextrose agar. (c) Growth on Sabouraud's dextrose agar (reverse) with no pigmentation

**Fig.4** *Epidermophyton floccosum*



(a) Lacto phenol cotton blue mount showing club shaped macroconidia. (b) White folded growth seen on Sabouraud's dextrose agar. (c) Growth on Sabouraud's dextrose agar (reverse)

**Fig.5** *Trichophyton tonsurans*

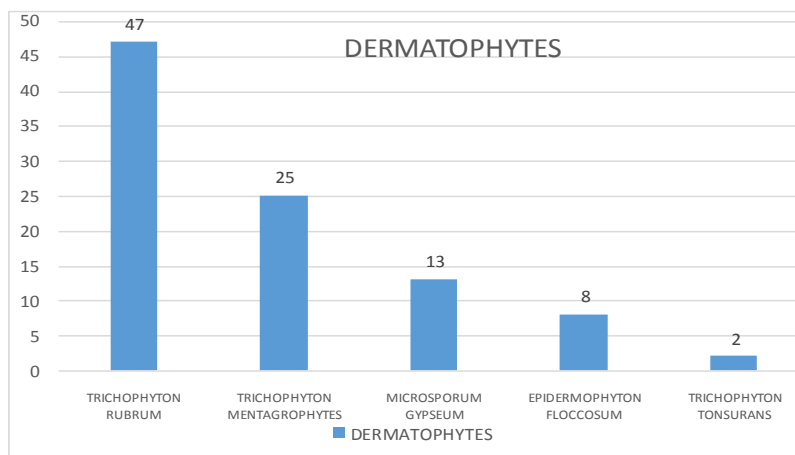


(a) Lacto phenol cotton blue mount showing septate hyphae and intercalary chlamydospores and microconidia. (b) Powdery growth on Sabouraud's dextrose agar. (c) Growth on Sabouraud's dextrose agar (reverse)

**Graph 1** Sex wise distribution



Graph 2 Different species of dermatophytes isolated



In the present study, highest incidence of Dermatophytosis was observed in the age group of 31–40 years. Studies conducted by Mohanty *et al.*, (10) and Sentamilselvi *et al.*, (11) also showed a higher prevalence in the same age group. The increased incidence of Dermatophytosis in this age group may be due to the fact that this population group takes part in maximum outdoor activities and due to greater physical activity and increased sweating in this age group favouring the growth of Dermatophytes which predisposes them to acquire infection from environmental exposure(12). However Mangala *et al.*, (13) observed a higher prevalence in the age group of 20-30 years.

In the present study, Tinea corporis was the most common clinical type seen in 73 of patients, which is in agreement with studies by Bindu *et al.*, (12), Mangala *et al.*, (13), Singh *et al.*, (14) and Lakshmi Poluri *et al.*, (16).

In the present study, out of 221 clinically diagnosed cases total culture positivity was 145(65.6%). This was comparable with the studies by Bindu *et al.*, (12), and Singh *et al.*, (14). In the present study, KOH positivity was 149(67.4%) and culture positivity was 145(65.6%). Culture positivity was more in KOH positive cases compared to KOH negative cases. Among 149(67.4%) KOH positives, 132(59.7%) were culture positive and

17(11.4%) culture negative which may be due to the lack of fungal viability to grow on SDA medium. This shows that direct microscopy by KOH mount is a good screening test in the laboratory diagnosis of Dermatophytosis. It was comparable with the study done by Uma *et al.*, (5) where 20 cases (16%) were KOH positive but culture negative. Where as in study done by Noronha *et al.*, (15) where KOH positive but culture negative isolates were 30 (20%).

As culture is gold standard, in present study, KOH negative and culture positive isolates were 14 (6.3%) which was comparable with study done by Uma *et al.*, (5) where KOH negative and culture positive isolates were 8 (6.4%).

In the present study, the most common culture isolate was *Trichophyton rubrum* 68(46.9%) followed by *Trichophyton mentagrophytes* 39(26.9%), *Microsporum gypseum* 22(15.2%), *Epidermophyton floccosum* 13(8.9%) and *Trichophyton tonsurans* 3(2.1%). This is in agreement with other studies by Anupama *et al.*, (8) and Lakshmi Poluri *et al.*, (16) where *T. rubrum* was the most common culture isolate. In a study done by Noronha TM *et al.*, (15) *T. mentagrophytes* was the most common isolate.

Dermatophytosis is the common superficial fungal infection among males around age group of 31 to 40 years. *Trichophyton rubrum* remains the most common etiological agent. Hence

clinico-epidemiological data is helpful for creating public awareness and for development of diagnostic, preventive and treatment strategies.

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### How to cite this article:

Sneha P. Naik, G.K. Mangala and Lava, R. 2019. Spectrum of Dermatophytic Fungal Infection in Tertiary Care Hospital, Davanagere. *Int.J.Curr.Microbiol.App.Sci.* 8(03): 165-171.  
doi: <https://doi.org/10.20546/ijcmas.2019.803.023>