

# A CROSS SECTIONAL DESCRIPTIVE STUDY ON CLINICAL TYPE AND ETIOLOGICAL AGENT OF SUPERFICIAL DERMATOPHYTOSIS

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## Abstract

**Introduction:** Present study was undertaken to identify the clinical pattern of superficial dermatophytes at a tertiary care center and to etiological correlation fungal pathogen responsible for the dermatophytosis. **Materials & Methods:** A prospective, observational study was conducted on patients attending the dermatology department of a tertiary care hospital with clinical features of dermatophytosis. A total of 115 eligible cases were included in the study after informed consent. Detailed socio-demographic and clinical history was taken from all patients. A skin sample was collected from the lesion site from all patients. The samples were transported to and processed at the Microbiology Department of the hospital laboratory. **Results:** Most common age group affected was 16-30 years with mean age of 28.4 years with male predominance (69.6%) Overall 149 sites were involved in 115 cases. Most common clinical type was T. Cruris (53%) followed by T. Corporis (23.5%). KOH mount was positive in 79 (53%) isolated out of 149 while culture was positive in 101 isolates (67.8%). Most common organisms isolated were T. rubram (54.5%) and T. Mentagrophytes (45.5%). T. rubram is the common organism isolated in Tinea corporis and cruris while T. Mentagrophytes was more commonly isolated in cases of Tinea pedis, capitis and faciei. **Conclusion:** Present clinico mycological study showed tinea cruris as the most common clinical pattern followed by tinea corporis and T. rubrum as the most common causative agent of dermatophytosis in this region with increasing trend of T. mentagrophytes. Involvement of face and scalp in adult population. Both direct microscopy and culture are important tools of diagnosis for the superficial fungal infections.

**Key Words-** Dermatophytic infections, Tinea Corporis, Tinea Cruris, Trichophyton

## Introduction

Dermatophytes are a group of closely related keratinophilic fungi that infect keratinized tissues such as hair, nails and skin. The disease caused by dermatophytes is known as dermatophytosis which constitutes an important public health problem, not only in underdeveloped countries but also in elderly and immuno-compromised patients worldwide<sup>1</sup>.

The etiologic agents of the dermatophytosis can be categorized into one of three genera: Epidermophyton, Microsporum and Trichophyton. They possess keratinophilic and keratinolytic properties. The infections due to these pathogens are generally cutaneous and restricted to the non-living, cornified layers of the skin<sup>2</sup>.

Traditionally, infections caused by dermatophyte (ring-worm) have been named by appending the latin name of the affected body part after the word "tinea"<sup>3</sup>. Tinea capitis (ringworm of the scalp) is the most common fungal infection in children. More than 90% of the infections are caused by Trichophyton tonsurans, and fewer than 5% are caused by Microsporum species<sup>3</sup>.

Since these infections are often confused with other skin disorders, it is therefore, necessary to make early laboratory diagnosis for better management of these conditions<sup>4</sup>. Various

studies have been conducted in different parts of the country including Chennai<sup>5</sup>, Madhya Pradesh<sup>6</sup>, Andhra Pradesh, Gujarat<sup>7</sup>, Chandigarh<sup>8</sup>, Karnataka<sup>9</sup> and few other states<sup>10,11</sup>. The distribution, frequency and the causative agents involved vary from place to place depending upon the climatic, socioeconomic conditions and the population density.

This study of superficial dermatophytes with clinical type was conducted in a service hospital catering to serving as well as retired personnel and their dependent family members. The working condition and environment of serving personnel are different from the general public. They have long working hours, continuous duty hours, wearing tight uniforms and shoes for long time which make them more prone to have dermatophytes infection. The incidence and type of dermatophytes infections in serving personnel may be different from general population. This study is thus undertaken to identify the clinical pattern of this disease in our center and to identify the most common fungal pathogen responsible for the dermatophytosis.

## Material and Methods

A Prospective, observational study was conducted on patients attending the Dermatology department of a tertiary care hospital with clinical features of dermatophytosis. Patients with use of antifungal therapy (oral as well as topical) within 2 months, presence of serious underlying systemic conditions, bacterial or

fungal infections in the skin folds and nails and with debilitating conditions like DM, CKD, etc. were excluded. Consecutive type of non-probability sampling was followed for the selection of the study subjects. A total of 115 eligible cases showing clinical features of dermatophytosis and fulfilling the eligibility criteria were included in the study after informed consent.

Study was commenced after approval by the institutional scientific research and ethical committee of hospital. Patients were included after taking written informed consent. Detailed socio-demographic and clinical history was taken from all patients. The information about the applications of antifungal therapy was obtained through inquiry from the patients or the clinician asked them to produce the outpatient chit if any treatment was taken during past 2–3 months and also the other information regarding chronic illness, immunosuppressive/ immunocompromised state including co-infection with HIV and other conditions such as diabetes. Detailed clinical examination done to diagnose the clinical type of tinea and to assess the size, shape, number, inflammation and for any secondary infection. A skin sample was collected from the lesion site from all patients. The samples were transported to and processed at the Microbiology Department of the hospital laboratory.

#### Sample Collection

The samples were collected in sterile black paper envelop after cleaning the site with 70% ethanol in order to remove the dirt and environmental contaminants. Skin scrapings were collected from advancing margins of the lesions with the help of sterile scalpel blade. In the toe cleft, material was collected by epilation forceps. Hairs for examination were plucked; only those hairs that are broken or lack luster were selected.

Wood's lamp was used whenever required to see the infected hairs as few dermatophytes produce a characteristic fluorescence. In case of black dot type of tinea capitis, material was obtained by scraping the scalp. Material from nail was collected by clipping the proximal part of the involved nails.

#### Examination of direct KOH mount

The samples of hair follicles, scrapings of skin and nails collected were treated with 10–40% KOH for 10 minutes to overnight (nail), and the samples mounted on a glass slide with Lactophenol blue were examined under microscope low power of magnification (10x and 40x) for fungal hyphae, spores, or yeast cells. The samples were then processed for the isolation of the dermatophytes species on Sabouraud's Dextrose Agar.

#### Isolation of dermatophytes

The samples were inoculated on Sabouraud dextrose agar (SDA) containing chloramphenicol (0.05 mg/mL) and cycloheximide (0.1–0.4 mg/mL) and incubated at 25 to 30 degree temperature. The cultures were examined once a week and were declared negative if no growth was obtained till 4 weeks. The isolates were further identified by studying the culture characteristics, pigment production, and microscopic examination of the lactophenol cotton blue (LPCB) mounts. Those samples that yielded 3 or more growth and were negative in KOH mount were considered contaminants/ mixed growth. Contaminants were defined as mixed growth on SDA without a positive KOH mount. The colonies were examined for their morphology, texture and examination of the reverse of the colony for the presence of characteristic pigmentation. The confirmation was done by microscopic examination of the

stained preparations.

#### Statistical Analysis

All the collected data was entered in Microsoft Excel Sheet 2007. The data was then transferred and analyzed using SPSS ver. 21. Quantitative and qualitative variables were presented as mean +/- SD and as frequency with percentages.

#### RESULTS

Most common age group affected by dermatophytic infections as observed in present study was 16–30 years (42.6%) with mean age of 28.4 years. Male predominance (69.6%) was observed in the present study with male to female ratio of 2.29:1. Most of the cases in present study were active servicemen (40.9%) with students (29.6%) and housewives (16.5%) being the next common groups. In most of the cases only a single site was involved (71.3%) while multiple sites were involved in 28.7% cases. Overall 149 sites were involved in present study. Most common clinical type was T. Cruris (53%) followed by T. Corporis (23.5%), T. faciei (9.4%), T. capitis (6%),

Clinical Types	N	%
T. Cruris	79	53.0%
T. Corporis	35	23.5%
T. Faciei	14	9.4%
T. Capitis	9	6.0%
Onychomycosis	6	4.0%
T. Pedis	4	2.7%
Scutular Tinea	2	1.3%
Total	149	100.0%

Onychomycosis (4%), T. Pedis (2.7%) and Scutular tenia (1.3%)(Table 1).

**Table 1:** Distribution of subjects based on clinical type of dermatophytic infection

Most common mixed infections were of T. Cruris and T. corporis (24/32; 72.7%) followed by T. cruris and T. faciei (4/32; 12.1%). KOH mount was positive in 79 (53%) isolated out of 149. Culture was positive in 101 isolates (67.8%) while it was negative/ contaminated in 48 isolates (32.2%). Most common

Species Isolated	N	%
T. Rubram	55	54.5%
T. Mentagrophytes	46	45.5%
Total	101	100.0%

organisms isolated were T. Rubram (n-55; 54.5%) and T. Mentagrophytes (n-46; 45.5%)(Table 2).

**Table 2:** Distribution of Subjects based on Species Isolated

T. rubram is the common organism isolated in Tinea corporis and cruris while T. Mentagrophytes was more commonly isolated in cases of Tinea pedis, capitis and faciei. T. rubram was the only organism isolated in cases of scrotal tinea and Onychomycosis (Table 3).

Clinical Types	Species Isolated		Total	Total Organisms	Culture positivity
	T. Rubram	T. mentagrophytes			
T. Corporis	17	11	28	35	80.0%
T. Cruris	28	20	48	79	60.8%
T. Pedis	0	3	3	4	75.0%
T. Capitis	3	4	7	9	77.8%
T. Faciei	2	8	10	14	71.4%
Scrotal Tinea	2	0	2	2	100.0%
Onychomycosis	3	0	3	6	50.0%
Total	55	46	101	149	67.8%

**Table 3:** Association of etiological agent with Clinical Type

## DISCUSSION

Most common age group affected by dermatophytic infections as observed in present study was 16-30 years (42.6%) with mean age of 28.4 years. Male predominance (69.6%) was observed in the present study with male to female ratio of 2.29:1.

These observation are in accordance with the findings of other authors<sup>12-17</sup> who observed maximum number of cases in the second and third decade of life. Surendra et al.<sup>17</sup> observed 44% cases in the age groups of 16-30 years. Mahajan S et al.<sup>14</sup> observed the most commonly affected age group as 20-40 years (52.4%). Although the majority of studies have observed higher incidence in the third decade, the study done at Calicut by Bindu et al.<sup>16</sup> observed higher incidence in the second decade. Male predominance was also observed in majority of the studies<sup>12-17</sup>. The higher incidence in males could be due to greater physical activity and increased sweating. Surendra K et al.<sup>17</sup> in their study observed 62% males as compared to 38% females. Mahajan S et al. observed the male to female ratio as 3:1 in their study<sup>14</sup> while Janardhan et al.<sup>15</sup> observed the ratio as 1.86:1.

Most common clinical type observed in present study was T. Cruris (53%) followed by T. Corporis (23.5%), T. faciei (9.4%), T. capitis (6%), Onychomycosis (4%), T. Pedis (2.7%) and Scutular tenia (1.3%). Tinea Cruris and corporis are the most common clinical types observed across various studies<sup>12-18</sup>. In the studies by Sardari et al.<sup>19</sup> and Verma et al.<sup>20</sup> it has been reported that tinea cruris was the most common clinical type. While in the studies by Surendra et al.<sup>17</sup>, Bindu et al.<sup>16</sup> and other studies<sup>13-15</sup>, tinea corporis was the most common clinical type of dermatophytic infections. In another clinicomycological study of superficial mycosis in a hospital in north-east India<sup>21</sup>, it was observed that tinea pedis (29.2%) as the most common dermatophytosis followed by tinea cruris (26.2%), which differs from other studies.

Prevalence of mixed infection as observed in present study was 28.7% cases. Most common mixed infections were of T. Cruris and T. corporis (24/32; 72.7%) followed by T. cruris and T. faciei (4/32; 12.1%). Prevalence of mixed infection as observed by Surendra et al.<sup>17</sup> was 46% while Mahajan et al.<sup>14</sup> observed the prevalence as 46.8%. Among the mixed clinical types, tinea corporis with tinea cruris combination was the highest in both studies. Similar findings have been reported by Peerapur et al.<sup>22</sup>.

KOH mount was positive in 79 (53%) isolated out of 149 while culture was positive in 101 isolates (67.8%). Our results are in accordance with the study by Belukar et al.<sup>23</sup>, Malik et al.<sup>24</sup> and Janardhan B et al.<sup>15</sup> which showed culture

positivity of 71%, 58.8% and 72% respectively. However, Kumar et al.<sup>12</sup> and Surendra et al.<sup>17</sup> observed overall positivity by culture as 42.4% and 39% respectively. KOH positivity rate as observed by various authors is as follows: Malik A et al. (61.1%)<sup>24</sup>, Kumar et al. (55.2%)<sup>12</sup>, Santosh K et al. (55.4%)<sup>13</sup> and Mahajan et al. (79.6%)<sup>14</sup>. High positivity rate was observed by Janardhan et al. (90%)<sup>15</sup> and Surendra et al. (96%)<sup>17</sup>.

Most common organisms isolated were T. Rubram (54.5%) and T. Mentagrophytes (45.5%). This is in accordance to reports of other workers from different regions of India where T. rubram is the common organism followed by T. mentagrophytes<sup>13,15-18,21</sup>. Mahajan et al. and Peerapur BV et al.<sup>14,22</sup> observed T. mentagrophytes as the commonest organism isolated while in another study by Grover et al.<sup>21</sup> in north-east India, isolated T. tonsurans as the most common dermatophyte followed by T. rubrum, which differs from other studies that reports T. rubrum as the most common fungal pathogen. Overall, the Trichophyton genera dominate the isolates in majority of the studies undertaken<sup>12-27</sup>.

Correlating clinical and mycological data, we found that T. rubram is the common organism isolated in majority of the cases while T. Mentagrophytes was more commonly isolated in cases of Tinea pedis and faciei. T. rubram was the only organism isolated in cases of scutular tinea and Onychomycosis. Surendra et al.<sup>17</sup> found that in all clinical patterns, T. rubrum was the chief organism isolated followed by T. mentagrophytes. Kumar et al.<sup>12</sup> observed T. rubrum as common isolate from all clinical types. In T. corporis 34 isolates (61.82%), in T. cruris 26 isolates (74.28%). in T. unguium 3 isolates (60%) were Trichophyton rubrum. In T. capitis and T. manuum T. faciei, only T. rubrum was isolated. Siddappa et al.<sup>28</sup> reported T. rubrum as the major isolate (81.82%) from all clinical types except tinea capitis. Patwardhan et al.<sup>25</sup> observed as T. rubrum as the commonest isolate in all clinical cases. It was prevalent in T. corporis and T. cruris. In study done by Seema Bhaduria et al.<sup>29</sup> T. rubrum was the main isolate in all clinical types 17/50 (34%). In the study done by G. Venkatesan et al.<sup>30</sup>, T. rubrum was the main causative agent in T. corporis (45.1%), T. cruris (22.6%). T. pedis (2.8%) onychomycosis 2(2.8%). Various other studies too observed T. rubrum as the commonest species isolated from most clinical types<sup>13-16,18,24</sup>.

## CONCLUSION

Dermatophytic infections are of concern because of their character of chronicity of the disease, relapses and poor quality of life due to itching and appearance of skin lesions. The study highlighted the various types of Dermatophytic infections in and around the places of Mumbai. Present clinicomycological study showed tinea cruris as the most common clinical pattern followed by tinea corporis and T. rubrum as the most common causative agent of dermatophytosis in this region but increasing trend of T. mentagrophytes which was not seen in old studies. Also increase trend of T. capitis and T. faciei in adult population which was not seen in previous studies. Both direct microscopy and culture are important tools of diagnosis for the superficial fungal infections. Chronicity and frequent relapses may be due to changing pattern of species or can be due to antifungal resistance. Further studies require to know the exact cause of chronicity, relapses.

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