



## Etiology And Prevalence Of Dermatophytes In Western Region (Mumbai) Of India

<sup>1</sup>Bhilkar Kavita A, <sup>2</sup>Kulkarni Monita S, <sup>3</sup>Nandvanshi Sameer, <sup>4</sup>Bade Jyoti B. <sup>5</sup>Chande Chhaya A\*,  
<sup>6</sup>Joshi Ameeta A

<sup>1,2,,4,5,6</sup>MD Microbiology, <sup>1,2,3,4</sup>Assistant Professor, <sup>2</sup>Junior Resident, <sup>5</sup>Professor, <sup>6</sup>Professor & Head,  
Department of Microbiology, Grant Government Medical College, Mumbai

**\*Corresponding Author:**

**Dr. Chhaya Chande**

MD Microbiology, Professor, Department of Microbiology, Grant Government Medical College, Mumbai

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### Abstract

**Introduction:** Dermatophytes are among the common fungal agents causing superficial mycoses worldwide. It includes mainly three genera Trichophyton, Microsporum, and Epidermophyton.

**Aim:** To study etiology and prevalence of superficial cutaneous infections in clinically suspected cases.

**Settings and Design:** This Retrospective cross-sectional study, was conducted at a tertiary care hospital in Mumbai over a period of 2 years.

**Methods and Material:** A total of 651 samples of skin scraping, nail scrapings and hair follicles were collected from different ringworm/tinea conditions and processed using standard mycological methods.

**Results:** On direct microscopy and culture, 145 samples (22.27%) were found positive for dermatophyte spp and Non-Dermatophyte Molds (NDM). Among dermatophytes, Trichophyton rubrum was the predominant isolate followed by Trichophyton mentagrophytes.

**Discussion:** The prevalence of dermatophytosis observed was 30.3%. The commonest clinical type observed in the present study was tinea corporis followed by tinea cruris and tinea unguium. A total of 69.6 % of the isolates were non-dermatophytic molds (NDM) comprising Candida spp., Aspergillus spp., and Fusarium spp., suggesting that non-dermatophytic molds are emerging agents of superficial infections.

**Conclusion:** It can be concluded that the present study gives insight into the etiology and prevalence of dermatophytosis and distribution pattern of dermatophytes flora in Mumbai, western region of India.

**Keywords:** Dermatophytes, Superficial mycoses, Tinea, Trichophyton species

### Introduction

Dermatophytosis is a disease condition characterized by the infection of keratinized tissues such as the epidermis, hair and nails. This condition is caused by a group of closely related filamentous fungi commonly known as dermatophytes. Dermatophytes are the members of the ascomycetes subgroup causing a wide range of dermatological manifestations, known as ringworm or tinea.<sup>1</sup> These infections of keratinized tissues caused by three groups of dermatophytes are classified as Anthropophilic, Zoophilic and Geophilic<sup>1</sup> according to their preference to man, animal and soil

respectively.<sup>2</sup> Within these groups, the three genera Trichophyton, Microsporum and Epidermophyton are recognized.

Dermatophytosis in India has received increasing attention in recent years from different parts of the country.<sup>3,4,5,6,7,8,9,10</sup> The infections due to these pathogens are generally cutaneous and restricted to the non-living, cornified layers of the skin. The typical infections of dermatophytes are generally referred to as ringworm infections due to their ring like appearance. Tinea infections are prevalent

globally but they are common in the tropics and may reach epidemic proportions in geographical areas with higher humidity, densely populated regions and poor hygienic living conditions<sup>2</sup>. The hot and humid climate of India makes dermatophytosis a very common superficial fungal infection of the skin<sup>11</sup>.

The climatic condition of Mumbai India is predominantly hot and humid with heavy monsoons, promoting fungal infections. About 20-25% of the world's population is said to be infected with dermatophytes and the incidence is increasing on a steady basis<sup>12</sup>. The present study was aimed to establish their etiological agents and changes in distribution patterns of the disease and prevalence of dermatophytosis in Mumbai region.

**Materials and Methods:** This Retrospective cross-sectional study, was conducted in a tertiary care hospital in Mumbai over a period of two years.

**Sample collection and processing:** The lesion site was sterilized with 70% alcohol and ensured total dryness. Then the samples were collected by scrapping skin, clipping nails and plucking the hairs with sterile scalpel and forceps. Collected samples were kept in a sterile black paper and carried to the laboratory for further analysis. Direct microscopic examination was performed using 10% KOH for skin and hair, 40% KOH and DMSO for nail clippings.<sup>13</sup> The samples were inoculated on two sets of plain on the Sabouraud's Dextrose Agar (pH 5.6 + 0.2) and SDA containing Cyclohexamide (0.05%) and chloramphenicol (0.004%) (Hi Media Laboratories). One set incubated at 37°C and other set at 28°C for 4 weeks and observed after an interval of 2-3 days<sup>2</sup>.

Fungal growth in relation to surface, texture and pigmentation noted. Lactophenol Cotton Blue Solution (LPCB) preparation of each fungal growth were performed for further identification. For definitive species identification slide culture test, hair perforation test and urease test were performed.<sup>14</sup>

## Results

Out of 651 cases of clinically suspected superficial infections, majority of specimens, were skin (320) and nail (321) followed by hair (10). In our study, cutaneous fungal infections were slightly more common in males (53%) than in females (47%) and the majority of the patients were between 20 to 50 years contributing 78.77% of the total dermatophytosis.

Direct microscopy was positive only in 45 (6.9%) patients. Among 145 culture positive cases, 44 (30.34%) were dermatophytes while 101 (69.65%) were non-dermatophyte molds. (Table 1). Tinea corporis was the prominent clinical manifestation of dermatophytosis followed by tinea cruris, and then tinea unguium. Among the dermatophytes *T. rubrum* (63.63%) was the predominant causative agent isolated mostly from tinea corporis and tinea cruris. The other dermatophytic species isolated were *T. mentagrophytes* (13.63%), *T. tonsurans* (11.36%), *T. verrucosum* (9.09%), and *Microsporum canis* (0.68%) (Table 2). In addition, among the culture positives non dermatophytic molds (NDM) (69.65%) *Aspergillus* spp (36.55%), *Fusarium* spp (15.17%), *Candida* spp (6.89%) were predominantly isolated. Epidermophyton species was not recovered in the present study.

**Table 1 : Fungal Isolates from superficial fungal infection**

Sr No.	Fungal Isolates on culture	Number (Percentage)
1.	Dermatophytes	44(30.34%)
2.	Aspergillus spp	53 (36.55%)
3	Fusarium spp	22 (15.17%)
4	Candida spp	10 (6.89%)
5	Zygomycetes	9 (6.20%)
6	Hortaeaspp	2 (1.3%)
7	Exophillaspp	1 (0.68%)

8	Neoscytalidium spp	1 (0.68%)
9	Trichosporon spp	1 (0.68%)
10	Acremonium spp	1 (0.68%)
11	Chrysosporium spp	1 (0.68%)
	Total	145(100%)

**Table 2 : Distribution of Dermatophytes**

S. No.	Name of the species	Number of Positives
1.	Trichophyton rubrum	28 (63.63%)
2.	Trichophyton mentagrophytes	06 (13.63%)
3.	Trichophyton tonsurans	05 (11.36%)
4.	Trichophyton verrucosum	04 (9.09%)
5.	Microsporum canis var distortum	01 (2.27%)
	Total	44 (100%)

**Discussion:**

The prevalence of dermatophytosis ranges from 36.6% to 78.4% in India.<sup>3,4,5,6,7,8,9,10,11</sup> In our study, the prevalence of dermatophytes is 30.3%. The studies conducted in Rajasthan<sup>4</sup>, Gujarat<sup>5</sup>, and Madhya Pradesh<sup>6</sup> also reported a high rate of dermatophytic infections in the respective population. This can be attributed to the high temperature for most of the time, which facilitates body sweating thus resulting in fungal growth<sup>8</sup>. Moreover, in the case of Himachal Pradesh and Meghalaya, the prevalence is less as compared to other published studies in India due to climatic conditions, particularly low temperature mostly throughout the year, but still infection persists in this region because of relatively high population density consisting primarily of farmers and construction workers/labours and high frequency of tourism<sup>7,10</sup>.

In the present study, tinea was slightly more common in males (53%) than in females (47%) and the majority of the patients were between 20 to 50 years contributing 78.77% of the total dermatophytosis. The predominance of male cases is mainly because they are physically more active, which predisposes them to increase sweating thus facilitating fungal growth<sup>7</sup>. The lower incidence in females might be due to the no reporting to the dermatology clinics and

the prevailing social stigma in the suburban and rural population near Mumbai<sup>15</sup>.

The commonest clinical type observed in the present study was tinea corporis followed by tinea cruris and tinea unguium. The finding with respect to tinea corporis is well correlated with the majority of studies conducted in India<sup>5,9</sup>. In this study, tinea unguium is the third most common tinea infection and T. rubrum was the most common isolate from these cases. The incidence of tinea unguium may be attributed to the fact that infection is typically asymptomatic, usually ignored by young adults and hence no proper medical treatment is taken. Infected nails serve as a chronic reservoir of infection leading to frequent mycotic infections of the skin<sup>5</sup>.

In the present study T. rubrum was the most prevalent causative agent followed by T. mentagrophytes which is in conformity with other studies in India<sup>3,4,5,6,7,8,9</sup>. Moreover, the frequency of recurrent infection with this dermatophyte is quite common because of its ability to produce less severe lesions, often left untreated or neglected by the patient. T. rubrum is the dominant species isolated from most of the clinical manifestations of dermatophytosis whereas T. mentagrophytes is the co-dominant species as reported by several studies in India<sup>3,5,7,8</sup>.

A total of 69.6 % of the isolates were non-dermatophytic molds (NDM) in our study. Though they are commonly referred to as contaminants and are reported to colonize damaged tissues leading to infection. Interestingly, the majority of the NDM was isolated from tinea unguium, suggesting their possible direct involvement in the infection. However, their primary role in the pathogenicity of superficial fungal infections cannot be established with certainty yet<sup>17</sup>.

Lakshmanan *et al.* (2015) reported 24.4% Non-Dermatophytic Molds in the study, mostly comprising *Candida*, *Aspergillus*, and *Fusarium*, suggesting that non-dermatophytic molds are emerging agents of superficial infections, particularly in nail<sup>17</sup>. The findings are in concurrence with our results.

The distribution pattern of dermatophytes in Mumbai India has changed during the course of time. This change in dermatophyte flora in the region is, due to the variation in climatic conditions and also immigration from the rest of India and surrounding countries as this region is being considered as the economic hub of the India. Moreover, a remarkable finding in our study was that the frequency of tinea unguium cases in the population studied which is significant because non-dermatophytic molds were more dominant. The main reason behind this is the emergence of NDM as primary agents of superficial infections in nail which are steadily but consistently displacing the primary dermatophytic species due to their fast growing characteristics and better adapted to the nail plates<sup>17,18</sup>

## References

1. Shraddha Dalvi, *et al* Original Research Article Isolation of Dermatophytes from Clinically Suspected Cases of Superficial Fungal Infections *Int.J.Curr.Microbiol.App.Sci* (2021) 10(10): 204-211
2. L. Ajello Published 1 August 1962 Present day concepts of the dermatophytes. *Biology Mycopathologia et mycologia applicata*
3. Balakumar S, Rajan S, Thirunalasundari T, Jeeva S (2012) Epidemiology of dermatophytosis in and around Tiruchirapalli, Tamilnadu, India. *Asian Pac J Trop Dis* 2(4):286–289

4. Sharma, M., Sharma, R. 2012. Profile of dermatophytic and other fungal infections in Jaipur. *Indian J. Microbiol.*, 52(2): 270-274
5. Bhavsar, H.K., Modi, D.J., Sood, N.K., Shah, H.S. 2012. A study of superficial mycoses with clinical mycological profile in tertiary care hospital in Ahmedabad, Gujarat. *National J. Med. Res.*, 2(2): 160-164
6. Gupta C. M, K. Tripathi, S. Tiwari, Y. Rathore, S. Nema, A. G. Dhanvijay, 2014. Current trends of clinicomycological profile of dermatophytosis in Central India India. *J. Dent. Med. Sci.*, 13(10): 2326
7. Lyngdoh C.L., W. V. Lyngdoh, B.Choudhury, K. A. Sangama, I. Bora, A. B. Khyriem, 2014. Clinico-mycological profile of dermatophytosis in Meghalaya. *Int. J. Med. Public Health*, 3(4): 254256
8. Kainthola, A., Gaur, P., Dobhal, A., Sundriyal, S. 2014. Prevalence of dermatophytoses in rural population of Garhwal Himalayan region, Uttarakhand, India. *Int. Res. J. Med. Sci.*, 2(8): 9-12
9. Maity, P.P., Nandan, K., Dey, S. 2014. Clinico-mycological profile of dermatophytosis in patients attending a tertiary care hospital in Eastern Bihar, India. *J. Evol. Med. Dent. Sci.*, 3(29): 8263-8269
10. Bhatia V. K., P. C. Sharma, 2014. Epidemiological studies on dermatophytosis in human patients in Himachal Pradesh, India. *Springerplus*, 3: 134
11. Niranjana HP, Padmaja N, Priyanka BV. *J. Evol. Med. Dent. Sci.* 2012. Study of onychomycosis at a tertiary care hospital in South India ;1(5):823–829. doi: 10.14260/jemds/132. [CrossRef] [Google Scholar]
12. Menan, E.I., Zongo-Bonou, O., Rout, F. Kiki-Barco, P.C., Yavo, W., N Guessan, F.N. *et al.* 2002. Tinea capitis in school children from Ivory Coast (western Africa). A 1998-1999 cross-sectional study. *Int. J. Dermatol.*, 41(4): 204-7
13. S Singh<sup>1</sup>, PM Beena<sup>2</sup> Comparative study of different microscopic techniques and culture media for the isolation of dermatophytes. *Indian*

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Volume : 21 | Issue : 1 | Page : 21--24

14. Mallika Sengupta<sup>1\*</sup>, Tamasi Mukherjee<sup>2</sup>, Rajat Dasgupta<sup>3</sup>, Parthajit Banerjee<sup>4</sup> Prevalence of Dermatophyte Infections in a Tertiary Care Medical College in Eastern India DOI: 10.36348/sjpm.2020.v05i05.015 | Received: 04.05.2020 | Accepted: 24.05.2020 | Published: 30.05.2020
15. Naseri, A., Fata, A., Najafzadeh, M.A., Shokri, H. 2013. Surveillance of dermatophytosis in northeast of Iran (Mashhad) and review of published studies. *Mycopathologia*, 176: 247-253
16. Lakshmanan, A., Ganeshkumar, P., Mohan, S.R., Hemamalini, M., Madhavan, R. 2015. Epidemiology and clinical pattern of dermatomycoses in rural India. *Indian J. Med. Microbiol.*, 33(5): 134-136
17. Original Research Article Recent Trends of Dermatophytosis in Northeast India (Assam) and Interpretation with Published Studies Z.L.A. 2004. Brazilian Ashkenazic Jews with chronic dermatophytosis caused by *Trichophyton rubrum*. *Braz. J. Microbiol.*, 35: 69-73
18. Grover, W.C.S., Roy, C.P. 2003. Clinico-mycological profile of superficial mycosis in a hospital in North-East India. *Med. J. Arm. Forces India*, 59(2): 114-6
19. Maulingkar, S.V., Pinto, M.J., Rodrigues, S. 2014. A clinic-mycological study of dermatophytoses in Goa, India. *Mycopathologia*, 178(3-4): 297-301
20. Patel D., G. Shrimali, 2010 A Study of Superficial Mycosis in South Gujarat Region. *National J. Commun. Med.*, 1(2): 85-88.