

## Current trends of Clinicomycological Profile of Dermatophytosis in Central India

Gupta CM<sup>1</sup>, Tripathi K<sup>2</sup>, Tiwari S<sup>3</sup>, Rathore Y<sup>4</sup>, Nema S<sup>5</sup>, Dhanvijay AG<sup>6</sup>

<sup>1</sup>(Professor, Department of Dermatology, L.N.Medical College & J.K.Hospital, Bhopal. India)

<sup>2,6</sup>(Professor, Department of Microbiology, L.N.Medical College & J.K.Hospital, Bhopal. India)

<sup>3,4</sup>(Senior Resident, Department of Dermatology, L.N.Medical College & J.K.Hospital, Bhopal. India)

<sup>5</sup>(Associate Professor, Department of Microbiology, L.N.Medical College & J.K.Hospital, Bhopal. India)

---

### Abstract:

**Background:** Dermatophytosis is one of the most common cutaneous fungal infections of public health importance. Its prevalence differs from place to place and is influenced by environmental conditions, personal hygiene and habits.

**Aim:** The present study was undertaken to assess the clinical and mycological profile of dermatophytic infection and identify the species of fungi using standard techniques.

**Materials and methods:** A cross sectional study was conducted in 100 clinically diagnosed patients of dermatophytosis attending the dermatology outpatient department of our hospital. Proforma containing structured questionnaire was also filled. Skin scrapings, nail scrapes or nail clippings and infected hair stubs were collected. All specimens were screened for dermatophytes by direct microscopy using KOH DMSO preparation and confirmed by fungal culture.

**Results:** Tinea unguium (52.0%) was predominant clinical condition. Males were affected more (79.0%) than females. Dermatophytosis was predominantly found in more than 60 years (32.0%) and 31-45 years (24.0%). Fungi were demonstrated in 55.0% cases by KOH mount and 46.0% cases were positive by culture. 16.0% cases were KOH negative and culture positive. Trichophyton rubrum (41.0%) was the predominant species.

**Conclusions:** Males with age group above 60 years were most commonly affected in our area. Predominant clinical type was tinea unguium probably because most of them were farmers and labourers with poor hygiene. Trichophyton rubrum was the commonest dermatophyte isolated. KOH negative and culture positive cases indicate that culture is a gold standard for isolation and identification of dermatophytes.

**Key words:** Dermatophyte, Dermatophytosis, Tinea, Trichophyton

---

### I. Introduction

Dermatophytosis (tinea) broadly includes superficial fungal infection of the skin, hair and nail. This disease is commonly seen in man and animals of both developed and developing countries. Though dermatophytosis does not cause mortality, it does leads to morbidity and is responsible for major health problem. India has a varied topography, however large part of India has hot and humid climate. During summer and monsoon dermatophytosis are very common superficial fungal Infection. <sup>[1]</sup> It is caused by group of closely related keratinophilic fungi, Trichophyton, Microsporum and Epidermophyton which are capable of invading keratinized tissues of skin and its appendages and are collectively called dermatophytes. <sup>[2]</sup> Depressed cellular immunity due to underlying conditions such as malignancy, administration of steroids or immunosuppressive drugs, endocrine disorders such as cushing's disease can lead to atypical generalised dermatophyte infection. <sup>[3]</sup> The varied clinical presentation of tinea is very often confused with other skin disorders. It may be due to unchecked application of broad spectrum steroid containing skin ointments and creams that lead to misdiagnosis and mismanagement, hence any such clinical diagnosis need to be supported by laboratory diagnosis. The present study was undertaken to assess the clinical and mycological profile of dermatophytic infection and identify the species of fungi using standard techniques.

### II. Materials and methods

**2.1) Study design:** A cross sectional study was planned after obtaining permission from Institutional ethics committee.

**2.2) Study period:** January to July 2014.

**2.3) Study group:** 100 clinically diagnosed patients of dermatophytosis attending the dermatology outpatient department of our hospital. Before collecting the sample, written informed consent was obtained from the

patient. In addition, proforma containing structured questionnaire related to personal history of the patient regarding age, sex, occupation, hobbies, life style, brief clinical history and duration of the disease was also recorded.

**2.4) Specimen collection:** Depending on the clinical types of dermatophytosis and site of lesions, skin scrapings, nail scrapes or nail clippings and infected hair stubs were collected. The site of lesions were cleaned with 70% alcohol to remove the dirt and contaminating bacteria, samples were collected in a sterile paper folds and labeled with details of the patient. All the samples collected were subjected to direct microscopy and culture.

**2.5) Specimen processing:** <sup>[2, 4]</sup> Direct microscopic examination was performed using 10% KOH (Potassium hydroxide) with 40% DMSO (Dimethyl sulfoxide) for the detection of fungal hyphae.

Culture: The clinical samples were inoculated into modified Sabouraud's dextrose agar, dermatophyte test medium and trichophyton agar casein base. The inoculated plates were incubated at 30<sup>0</sup>C and 37<sup>0</sup>C for 3 weeks. Isolation of dermatophytes was confirmed by gross morphology of growth, typical microscopic characteristics supplemented with urease test, hair perforation test and slide culture.

### III. Results

100 patients were further clinically diagnosed as tinea unguium (52.0%) tinea corporis (25.0%) and tinea pedis (9.0%). Male members were affected more than the female (79.0%) and the M: F ratio was 3.8:1 [Table 1].

Clinical manifestation in relation to age showed the dermatophytic fungal infection was predominantly found in more than 60 years of age (32.0%) followed by 31-45 years (24.0%) as shown in [Table 2].

Microscopic observation revealed the presence of fungal hyphae by KOH mount in 55.0% cases as shown in Table 3. Total of 46.0% cases were positive by culture for dermatophytes and 12.0% cases were culture positive for non-dermatophytes. 42.0% cases were culture negative. 16.0% cases which were KOH negative reveal positive culture.

Table 4 shows identification of dermatophytic fungi. Among all the pathogens identified Trichophyton rubrum (41.3%) was the predominant species followed by Trichophyton mentagrophytes (28.3%).

**Table 1: Distribution of samples with reference to clinical manifestation and sex**

Clinical manifestation	Total number of samples n (%)	Sex	
		Male n (%)	Female n (%)
Tinea corporis	25 (25.0)	19 (76.0)	6 (24)
Tinea unguium	52 (52.0)	38 (73.0)	14 (26.9)
Tinea capitis	7 (7.0)	7 (100.0)	0 (0.0)
Tinea manuum	7 (7.0)	7 (100.0)	0 (0.0)
Tinea pedis	9 (9.0)	8 (88.9)	1 (11.1)
<b>Total</b>	100 (100)	79 (79.0)	21 (21.0)

**Table 2: Distribution of samples with reference to clinical manifestation and age**

Clinical manifestation	Total no. of samples n (%)	0-15 n (%)	16-30 n (%)	31-45 n (%)	46-60 n (%)	> 61 n (%)
Tinea corporis	25 (25.0)	4(16.0)	8(32.0)	5(20.0)	3(12.0)	5(20.0)
Tinea unguium	52(52.0)	0(0.0)	8(15.4)	11(21.2)	11(21.2)	22(42.3)
Tinea capitis	7(7.0)	2(28.6)	1(14.3)	3(42.4)	1(14.3)	0(0.0)
Tinea manuum	7(7.0)	0(0.0)	0(0.0)	1(14.3)	3(42.9)	3(42.9)
Tinea pedis	9(9.0)	1(11.1)	1(11.1)	4(44.4)	1(11.1)	2(22.2)
<b>Total</b>	100 (100.0)	7(7.0)	18(18.0)	24(24.0)	10(10.0)	32(32.0)

**Table 3: Results of Direct microscopy (KOH) and culture**

Culture	Number of cases n (%)		Total n (%)
	KOH Positive n=55	KOH Negative n=45	
Culture Positive			
Dermatophytes	30	16	46 (46.0%)
Non-dermatophytes	12	0	12 (12.0%)
<b>Total</b>	42(76.4%)	16(35.6%)	58 (58.0%)
Culture Negative	13(23.6%)	29(64.4%)	42 (42.0%)

**Table 4: Prevalence pattern of dermatophytic fungi**

Clinical manifestation	Total no of samples n (%)	Trichophyton rubrum n (%)	Trichophyton mentagrophyte n (%)	Trichophyton tonsurans n (%)	Trichophyton verucosum n (%)	Epidermophyton floccosum n (%)	Total n (%)
Tinea corporis	25 (25.0)	3 (12.0)	4(16.0)	3(12.0)	1(4.0)	1(4.0)	12(45.0)
Tinea unguium	52(5.0)	14(26.9)	06(11.5)	2(3.8)	03(5.7)	1(1.9)	26(50.0)
Tinea capitis	7(7.0)	2(28.6)	1(14.2)	1(14.2)	0(0.0)	1(14.2)	5(71.4)
Tinea manuum	7(7.0)	0 (0.0)	0(0.0)	1(14.2)	0(0.0)	0(0.0)	1(14.2)
Tinea pedis	9(9.0)	0(0.0)	2(22.2)	0(0.0)	0(0.0)	0(0.0)	2(22.2)
<b>Total</b>	100(100.0)	19(41.3)	13(28.3)	7(15.2)	4(8.7)	3(6.5)	46(46.0)

#### IV. Discussion

Dermatophytosis has a wide geographical distribution; the species of dermatophyte causing infection may vary from region to region and are geographically restricted except some species like Trichophyton rubrum which have a cosmopolitan distribution.<sup>[5]</sup> The present study was conducted to assess the clinical and culture profile of dermatophytic infection.

In our study of 100 cases, tinea unguium was the commonest clinical type observed (52.0%) followed by tinea corporis (25.0%) [Table1]. This is comparable to the previous studies conducted by Shinu Pottathil et al<sup>[6]</sup> who observed 46.78% tinea unguium and 20.18% tinea corporis. However, Kak S et al<sup>[7]</sup> reported 44.3% tinea corporis. Verma et al<sup>[8]</sup> found tinea cruris as the commonest clinical type. This diversity in distribution is due to studies conducted in one region of the country which may not be a true representation of the overall disease pattern of that country. Tinea unguium is clinically defined as the dermatophytic infection of the nail plate.<sup>[9]</sup> The higher incidence of tinea unguium may be attributed to the fact that infection is mostly asymptomatic and elderly make less effort to take proper medical service. Infected nails serve as a chronic reservoir of infection which can give rise to repeated mycotic infections of the skin. This fact necessitates the timely use of clinical and laboratory facility in order to take prompt and specific antifungal treatment. This may help to prevent nail dystrophy and the spread of infection

This study revealed that the males (79.0%) were affected more than females (21.0%) [Table1]. Similar findings were noticed in a study by Balakumar S et al,<sup>[10]</sup> where 67.1% assessed were males and 32.9% were females, Kak S et al<sup>[7]</sup> also noticed the same findings. This may be attributed to the fact that males are more involved in outdoor physical activities, which leads to excessive sweating making a favourable environment for the fungal infections. The lower incidence of dermatophytosis in females may be due to the not reporting of the female patients to the hospitals due to prevailing social stigma especially in the rural population in India.<sup>[11]</sup>

Majority (32.0%) of the infection has occurred above 60 years and followed by age group of 31-45 years [Table 2]. This observation is in contrast to the study conducted in eastern province of Saudi Arabia by Hashem Al Sheikh<sup>[12]</sup> who reported preponderance of infection in 16-30 years age group. Balakumar S et al<sup>[10]</sup> also reported predominant clinical manifestation in the age group of 11-30 years (25.6%). In our study the preponderance of clinical manifestation in this age group was because most of these patients belonged to lower economic groups with occupations such as farmers and daily wage laborers. Some of the patients had close association with domestic or pet animals such as cattle, dogs, cats and fowls. Environmental conditions such as hot and humid climate also a contributing factor for causing dermatophytosis in these age groups.

As in our study, fungal infection in clinical isolates was detected by KOH DMSO mount which later on confirmed by culture as shown in Table 3. Positivity rates of KOH mount was found to be 55.0%. 46.0% of culture positive was dermatophytes and remaining 12.0% were non-dermatophytic fungi (3 isolates of Fusarium and 9 isolates of Aspergillus) which were excluded. 16.0% cases which were KOH negative but culture positive. This study is in accordance with the study of Doddamani PV et al<sup>[13]</sup> who reported 65.0% KOH positive and 39.0% culture positive. 9.0% were KOH negative and culture positive. Singh S et al<sup>[1]</sup> also found more positivity rate of detection by KOH mount (60.4%) than culture (44.6%) and only 3.8% were KOH negative and culture positive. Direct microscopic examination using KOH is very simple technique giving rapid presumptive diagnosis. Addition of DMSO in KOH was found to be a better preparation, since it permits rapid clearing of keratin and almost immediate examination of sample without warming of slide and also prevents rapid drying of the fluid.<sup>[14]</sup> This test can be performed with less resource even in a rural set up. Although fungal culture takes time, it is a necessary adjunct to direct microscopic examination for definitive identification of dermatophytosis.

Distribution of dermatophytic fungi in different clinical patterns showed Trichophyton rubrum (41.3%) was the commonest aetiological agent [Table4]. The study coincides with the findings of Venkatesan G et al<sup>[12]</sup> (70.6%) and Suruchi B et al<sup>[5]</sup> who reported 66.2% Trichophyton rubrum. However, in another study from North-east India by Grover et al<sup>[15]</sup> Trichophyton tonsurans was the most common dermatophyte followed by Trichophyton rubrum. Preponderance of this dermatophyte is due to its greater capacity to infect the nails and colonize on the hard keratin of the nail plates.<sup>[16, 17]</sup> According to Aya et al<sup>[18]</sup> the severity of the lesions produced by Trichophyton rubrum is less when compared to other species of dermatophytes.

## V. Conclusions

Dermatophytosis is a public health problem affecting children, adolescents and adults even in our area. The present study reveals that commonest clinical type was tinea unguium. Males were more frequently affected than females. The highest incidence of dermatophytosis is seen in above 60 years and the commonest isolate was *Trichophyton rubrum*. Dermatophytosis diagnosis based on the clinical manifestations confirmed by the KOH examination and gold standard culture is best strategy for the diagnosis and correct treatment of the patient. Therefore, any clinical diagnosis needs to be supported by KOH examination and fungal culture. Even if culture facility not available, KOH examination should be performed on routine basis. The treatment of dermatophytosis would be more effective and meaningful when the selection of antifungal agent is based on the identity of the causative agent.

## Acknowledgement

We are thankful to our laboratory technician Miss Shiva Saxena for her sincere co-operation throughout this project.

## References

- [1]. Singh S, Beena PM. Comparative study of different microscopic techniques and culture media for the isolation of dermatophytes. *Indian J Med Microbiol* 2003; 21:21-4.
- [2]. Chander J: Dermatophytoses. In: Textbook of Medical Mycology. 3<sup>rd</sup> Edn; Mehta publishers, New Delhi, 2009, pp.134-141.
- [3]. Hay RJ. Genetic susceptibility to dermatophytoses. *Eur J Epidemiol* 1992; 8:346-9.
- [4]. Larone DH. Dermatophytes. In: medically important fungi – A guide to identification. 4<sup>th</sup> Edn; ASM Press, Washington DC 2002; 241-53.
- [5]. Suruchi B, Sunite AG, Anil K, Nand LS. Mycological pattern of Dermatophytosis in and Around Shimla Hills. *Indian Journal of Dermatology* 2014; 59(3): 268-70.
- [6]. Pottathil S, Naduvil SN, Singh V A, Sreeshama P. Clinicomycological and epidemiological profile of dermatophytosis in a rural referral center. *Current trends in Biotechnology and chemical Research* 2011; 1(2):121-6.
- [7]. KAK S, Bhat RM, Bolor R, Nandakishore B, Sukumar D. A Clinical and Mycological Study of Dermatophytic Infections. *Indian Journal of Dermatology* 2014; 59(3): 262-67.
- [8]. Verma BS, Vaishnav VP, Bhat RP. A study of dermatophytosis. *Indian J dermatol Venerol Leprol* 1970; 36:182.
- [9]. Oberoi C, Miskeen AK. Superficial fungal infections. IADVL Text book and atlas of dermatology 1994; 1:184-85.
- [10]. Balakumar S, Suyambu R, Thirunalasndari T, Jeeva S. Epidemiology of dermatophytosis in and around Thiruchirapalli, Tamilnadu, India. *Asian Pac J Trop Dis* 2012; 2(4):286-89.
- [11]. Venkatesan G, Ranjit Singh AJA, Murugesan AG, Janaki C, Gokul Shankar S. *Trichophyton rubrum*-the predominant etiological agent in human dermatophytosis in Chennai, India. *Afr J Microbiol Res* 2007; 1(1):9-12.
- [12]. Hashem Al Sheikh. Epidemiology of Dermatophytes in the Eastern Province of Saudi Arabia. *Research Journal of Microbiology* 2009; 4(6):229-34.
- [13]. Doddamani PV, Harshan KH, Kanta RC, Gangane R, Sunil KB. Isolation, Identification and Prevalence of Dermatophytes in Tertiary Care Hospital in Gulbarga District. *People's Journal of Scientific Research* 2013;6(2):10-13.
- [14]. Rebel G, Taplin D. Dermatophytes, Their recognition and identification 2<sup>nd</sup> Ed. (Miami University Press. Miami) 1970.
- [15]. Grover SC, Roy PC. Clinicomycological profile of superficial mycosis in a hospital in North East India. *Medical Journal Armed Forces India* 2003;59:114-16.
- [16]. Clayton YM. Clinical and mycological aspects of onychomycosis and dermatomycosis. *Clin Exp Dermatol* 1992; 14:37.
- [17]. Hay RJ. Onychomycosis. *Dermatol Clin* 1993; 11(1):167.
- [18]. Aya S, Jose RFM, Maria EHM, Matilde R, Nancy AG, Celso JG, et al. HLA in Brazilian Ashkenazic Jews with chronic dermatophytosis caused by *Trichophyton rubrum*. *Brazilian J Microbiol* 2004; 35:69-73.